THE
physical therapy REVIEW

37th Annual Conference
American Physical Therapy Association
Penn-Sheraton Hotel Pittsburgh, Pennsylvania
June 26 — July 1, 1960

Safe Practices in the Physical Therapy Department — DECKER

Paralysis of the Shoulder Subsequent to a Comminuted Fracture of the Scapula: Rationale and Treatment Methods — NUNLEY and BEDINI

A Survey of the Work Load in Physical Therapy — ZIMMERMAN and JOHNSON

Electromyographic Kinesiology of the Hand: Part I. Method — BROWN, LONG, and WEISS

Case Reports — WROE

Suggestions from the Field — PICOU

Conference Issue

Volume 40, Number 6 **June 1960**

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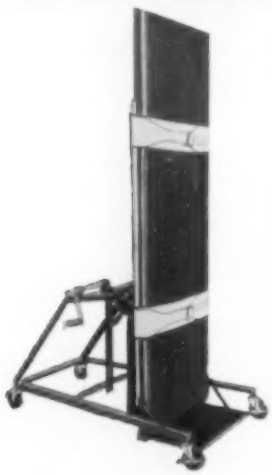

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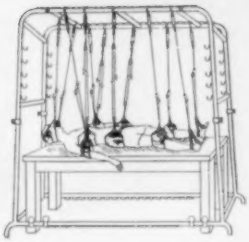

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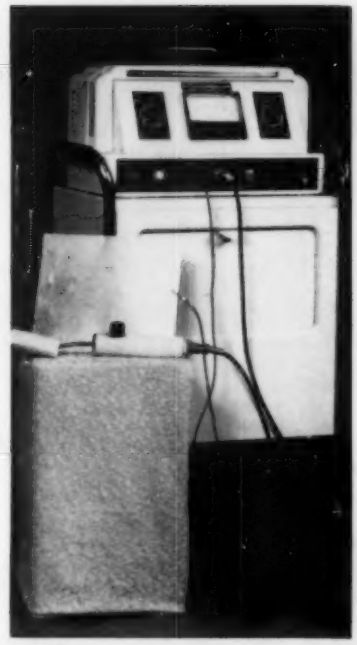

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June 1960
Vol. 40 No. 6

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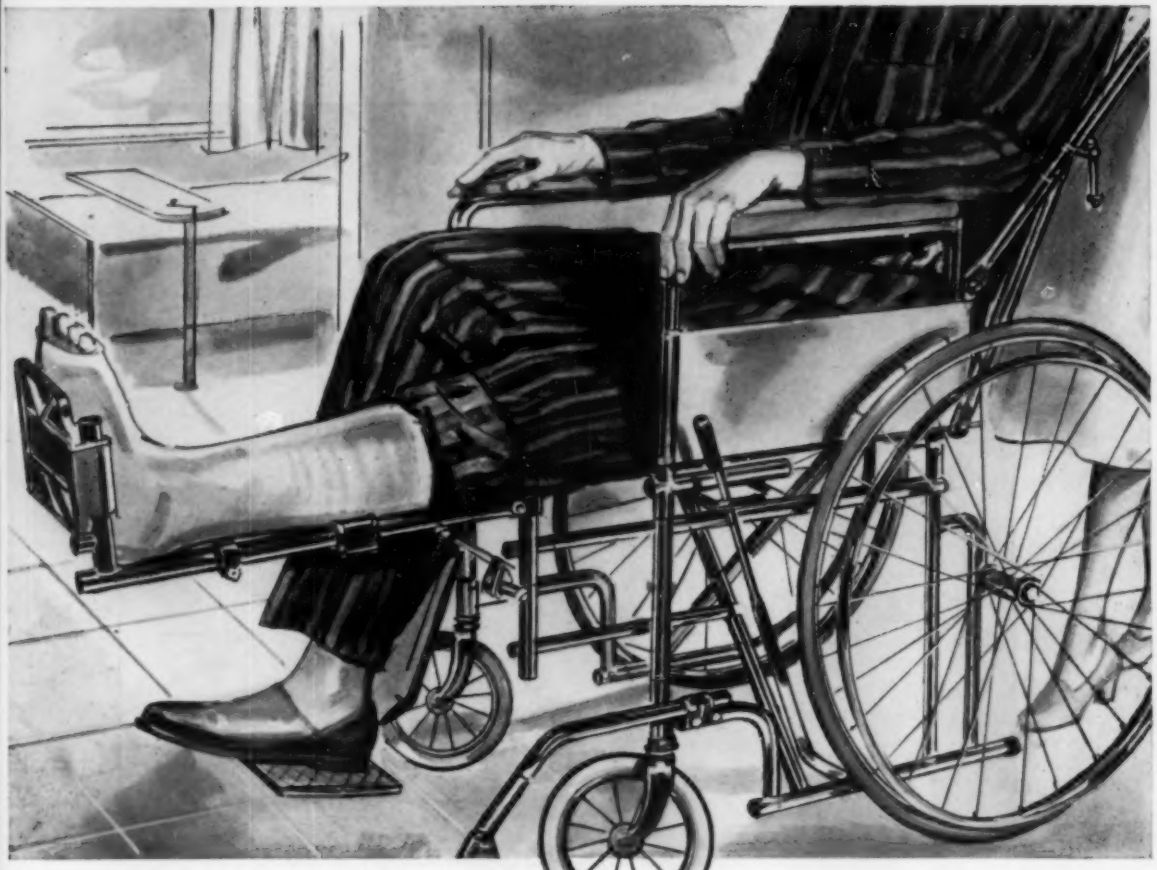

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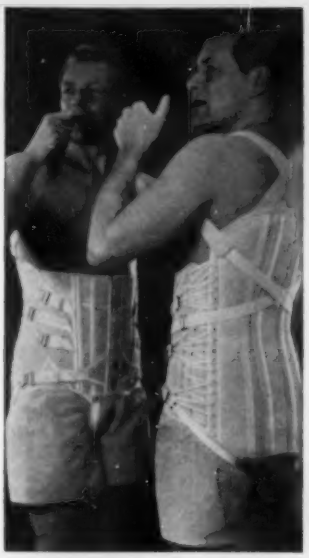

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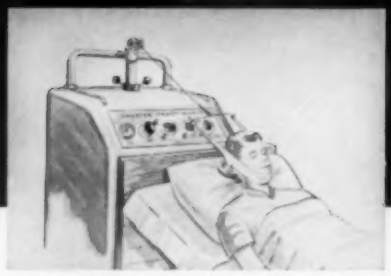

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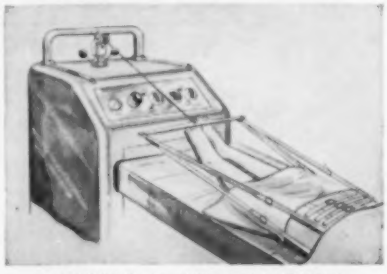

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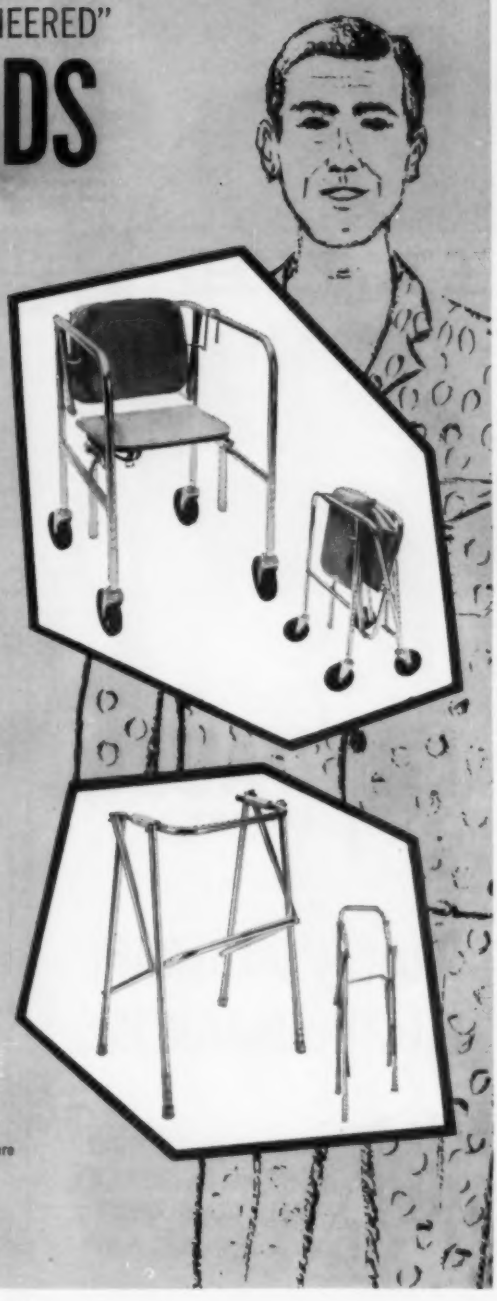

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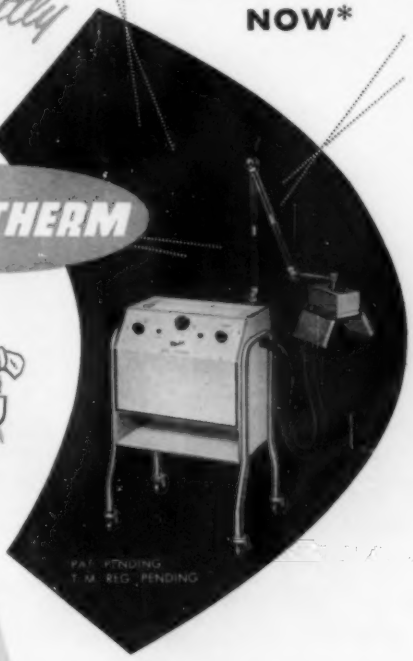

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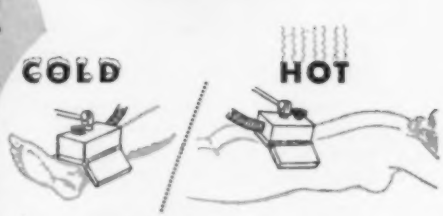

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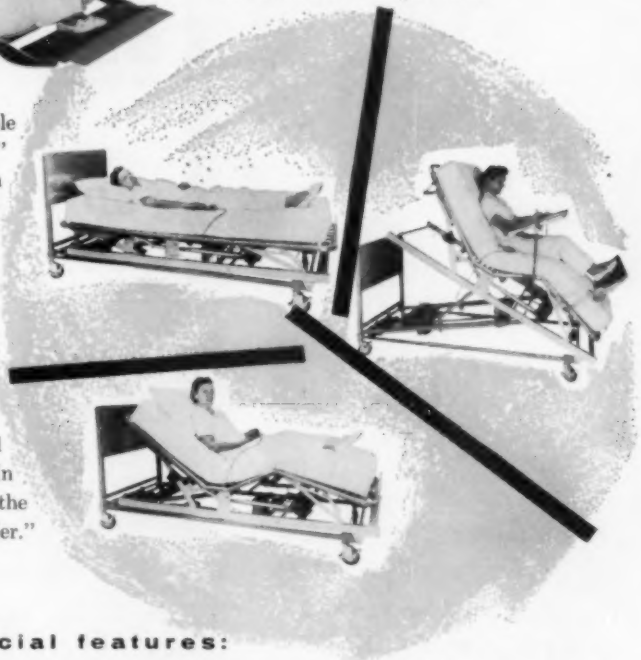

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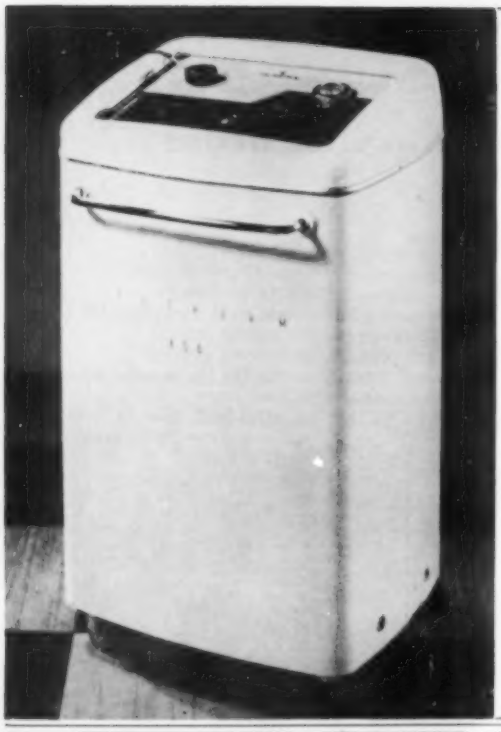

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Colorado*†: Apply to Adelaide Doing, Sec., State Board of Physical Therapy, 4200 E. 9th Ave., Denver 20.

Connecticut*†: Apply to Sarah C. Johnson, Sec., Board of Examiners for Physical Therapists, 436 Capitol Ave., Hartford. Examinations held in Hartford.

Delaware*†: Apply to State Examining Board of Physical Therapists, 302 Waverly Rd., Wilmington 3.

Florida*†: Apply to Homer L. Pearson, M.D., Sec., State Board of Medical Examiners, 901 N.W. 17th St., Miami 36.

Georgia*: Apply to C. L. Clifton, Joint Sec., State Examining Boards, 224 State Capitol, Atlanta.

Hawaii*†: Apply to Department of Health, P.O. Box 3378, Honolulu.

Illinois†: Annual examination, third Friday of October. File applications 15 days in advance. Apply to Judge Vera M. Binks, Director, Department of Registration and Education, Capitol Building, Springfield. Examinations held at 160 No. La Salle St., Chicago.

Indiana: Annual examination. Mid-June. File applications by May 15. Apply to Ruth V. Kirk, Exec. Sec., State Board of Medical Registration and Examination, 538 K. of P. Building, Indianapolis 4. Examinations held at Indiana University Medical School, 1100 W. Michigan, Indianapolis.

Kentucky†: Semiannual examinations, April and October. File application by March 1 or September 1. Apply to Agnes Shehan, Sec., State Board of Physical Therapy, Kentucky Crippled Children Commission, 982 Eastern Parkway, Louisville 17. Examinations held in Frankfort.

Maine: Thrice yearly examinations. Apply to Stephen A. Cobb, M.D., Sec. Medical Examining Board, 34 Winter St., Sanford. March and November examinations held at Portland City Hall, Portland; July examination held at State House, Representative Chambers, Augusta.

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South Carolina*†: Apply to Ruth S. Linley, Sec., State Board of Physical Therapy Examiners, 319 Walker St., Columbia.

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Virginia†: Semiannual examinations, February and September. Apply to State Board of Medical Examiners, 631 First St., S.W., Roanoke. Examinations held at Medical College of Virginia, Richmond.

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Wisconsin*: Thrice yearly examinations, April, Mid-September and at the discretion of Examining Committee. File applications at least two weeks in advance. Apply to Emma Zitzer, Sec., Physical Therapy Examining Committee, 207 North Brooks St., Madison 5. April examination held in Milwaukee; September examination held in Madison.

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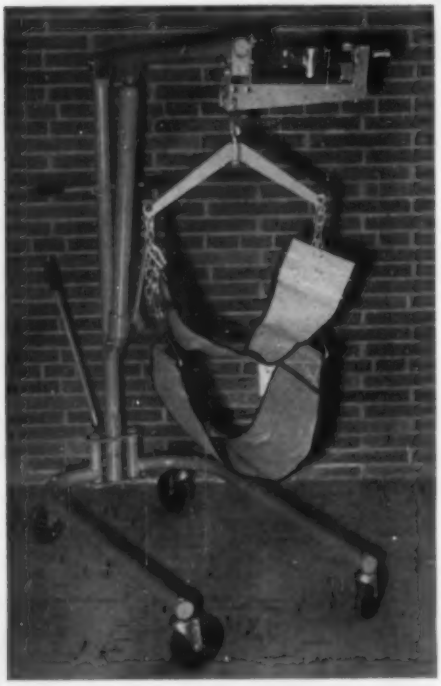

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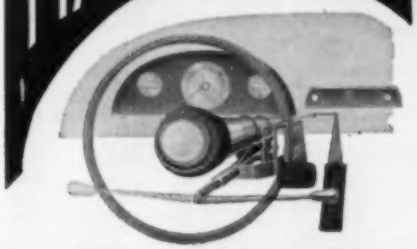

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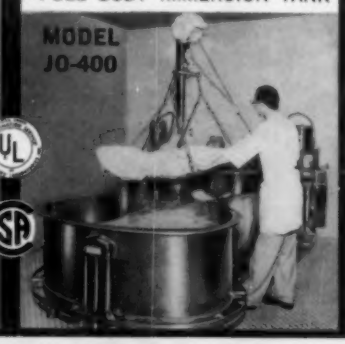

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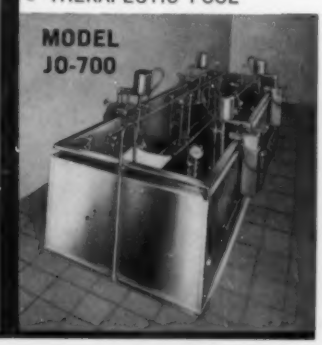

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Safe Practices in the Physical Therapy Department*

Ruby Decker, B.S.

What does the subject, Safe Practices in the Physical Therapy Department, encompass, and whom does it concern? It is of primary importance to all who enter a physical therapy department—the patient, his family, those who bring him to the department, visitors, physical therapists, students, and auxiliary personnel. Secondarily, it concerns the referring physicians, administrators of hospitals, clinics and physicians' offices, and counselors of potential students of physical therapy at high school and college levels.

Without safety in a department there would be no such profession as physical therapy. Young people would not be interested in the field, physicians would not risk referring their patients, and from a legal point of view institutions could not afford such a department. As a result there would be a greater number of physically dependent persons following disease or injury. Those born with physical handicaps would have less hope for maximum improvement of function.

Let us take each area of concern, discuss the safety risks, and propose methods of eliminating them. We will find at the onset that education is the basic tool for the prevention of harm, and begins with the physical therapy student.

It is well known that the energies used as physical therapies do good when properly applied. It is equally well known that these same energies can produce harmful effects if applied improperly, or used in excessive amounts. Students, therefore, should have more than an "orientation" course in the dynamics of the energies they apply as therapeutic tools. A basic course in physics coupled with the technics of application of physical therapies, a well grounded foundation in physiology, pathology, anatomy, and kinesiology with the ability to correlate intensity and effect in each individual situation will make possible safe application of physical therapies both for the patient and the physical therapist administering the treatment. Chronologically, the basic sciences should precede the courses in the technics to provide a background for understanding the principles involved.

When students are learning the technics they should keep records of objective observations. During laboratory practice on themselves they should keep accurate accounts of the intensity of the energy employed, the physiological effects produced, and psychological reactions if present. These, in turn, should be discussed and correlated in conferences. First hand information derived from a well planned laboratory exercise or experiment is the best way to learn about individual differences in reactions, and to gain respect for the potentialities of the energies employed in treatment. For example, students will learn that heat in the form of a full immersion bath may cause an elevation of systolic blood pressure which is contrary to the usual concept;[2] that the same person will not respond the same way on different days; that there may be such a decrease of pulse pressure that the recipient of the treatment will faint; that there may be a delayed fall of systolic pressure, that immersion in a bath of 102 degrees F., will produce a systemic temperature of 100.4 degrees in 20 minutes; and that a bath beginning at 104 degrees F., increased to 108 degrees in 18 minutes will produce a bodily temperature of 102.8 degrees.[11]

Educational Director, School of Physical Therapy, University of Texas—Medical Branch, Galveston.

* Presented at the AHA Institute for Physical Therapists, Houston, Texas, November, 1959.

They will observe that some students become restless, while others may border on panic at the higher temperatures. They will learn why it is never safe to leave a patient alone while in the full immersion bath. They will also realize that these are findings on healthy persons. What then will be the response of a sick patient with depressed physiology? Students must learn to read the signs of reactions. In order to apply physical therapy with safety they must tailor the intensity of the energy to the ability of the specific patient to have a favorable response. This cannot be accurately determined before the treatment is underway. I have used only one example. The energies of electricity, ultrasound, infrared, diathermy, ultraviolet, and the physiological energy of exercise are also powerful and deserve respect. A student who has learned how the energy is generated, who has mastered a careful technic, who is sensitive to physiological and psychological responses will become the physical therapist who makes the application of physical therapies a safe procedure for the patient. Furthermore, because of his knowledge of the potential force of the energy, the physical therapist can handle it without personal harm.

Safe practices for the patient, for the physical therapist, and for the administrators of the department hinge upon proper referral of patients by a physician. Please note the qualifying adjective "proper." The physician, after a physical examination and necessary tests, makes the diagnosis. With a knowledge of the energies available, he then prescribes the physical therapy that will produce the specific physiological response that is therapeutic. This prescription should include all the diagnoses present, not just the one for which physical therapy is ordered. For example, a patient with an intervertebral disk syndrome and hypertension would not be given the same dosage of exercise as one without such a complicating condition. The prescription must be signed by the referring physician to be valid. As all of us know, ethical practice of physical therapy by a qualified physical therapist can only be initiated upon the prescription of a physician. At this point in such a discussion, the question frequently arises, "What do you do if you have cause to believe that the prescription will produce harmful effects?" Obviously, there is only one thing to do. Get in touch with the referring physician and discuss the matter with him. Usually you will find that there are extenuating circumstances. If the situation worsens, a physical therapist should then notify the administrator of the facility in which he works and refuse to give the treatment. It may mean looking for another job. This is, however, a matter of personal and professional integrity. To quote, "Unto thine ownself be true, and it follows as night the day, thou canst then be false to no man." Fortunately, such situations are indeed rare. The prescription, in essence, is a safety device for all concerned. Progress notes are also an essential component in safe practices.[6] They are a record of what has occurred. They keep the physician informed of his patient's progress and are an integral part of the master chart. They should be concise and explanatory to the point that another physical therapist could carry on with the treatment after reading them. A signed prescription and well written progress notes are a foil in cases of litigation.

Negligence is defined as failure to exercise the care that the circumstances justly demand. The fault may be either one of commission, or one of omission.[3,5] If harm results from negligence, redress by means of court action may ensue. The wrong may be caused by either administrative or medical negligence. Both may occur in a physical therapy department. Harm done to the patient on the part of the staff is medical negligence. If any one falls on a slippery waxed floor, it is administrative negligence. Redress in court for harm done to a patient is the modern version of the ancient "Lex Taliones" (Law of the Claw) which was initiated in Babylonia circa 1950 B.C. by Hammurabi. It exacted an eye for an eye, a tooth for a tooth, and even the life of the doctor if his patient should die. No longer is an exact part required as damages for loss or harm, but compensation is derived by payment of money. No longer is the principle applicable to physicians only.

Every one in a department should be on the alert against negligence. Listed below are some precautions which are, in many instances, really a part of careful technic, but are so simple and commonplace that they are frequently overlooked.

1. Never leave a child or a disturbed patient on a stretcher or treatment table unattended unless secured by restraining straps, or "saddle-bag" type of sandbags.
2. Patients waiting on stretchers for transportation should be secured by tucking the top sheet under the stretcher pad, or by the use of wide straps.
3. Safety belts should be used in early gait training for severely involved or unsteady patients.
4. Helmets should be worn by patients if there is a tendency to fall when walking unattended.
5. Timers should be used.
6. Shields should be kept on luminous infrared lamps. Only shields made of screen wire will give adequate protection in case the bulb explodes.

7. A physical therapist should be within call of all patients undergoing treatment.
8. Patients should be instructed to report any untoward events or uncomfortable sensations.
9. Patients in the full immersion bath should be kept under constant observation.
10. Rickety equipment should *never* be used. This is particularly important in mobile units such as wheel chairs, walkers, stretchers, parallel bars, tilt tables, and suspension for head traction.
11. Thermostats on heating devices should be accurate and in good repair.
12. An appreciation of trophic changes which occur in bones subjected to disuse will prevent the occurrence of fractures when moving or turning a patient, or when the patient begins weight bearing.

There are, of course, other precautions peculiar to each local situation.

Physical therapists and auxiliary personnel deserve consideration in any safety program. The nature of the work may produce strains and stresses upon the muscular and skeletal systems. An understanding of the basic principles of body mechanics, and the application of these principles in a working situation are necessary. The general laws of biomechanics apply to the posture assumed by those working in a physical therapy department in carrying out prescribed treatment, and when lifting or carrying patients or objects. Many good articles have been written on this subject.[8,9] Carelessness in personal habits and disregard for well founded rules can be hazardous to the employee. Here are some basic precautions to keep in mind.

1. Do not climb up on insecure supports.
2. Have a protective ledge for the bottles placed on a shelf under the treatment table, or on a side table.
3. If ethyl chloride is used, keep the bottles in a cupboard. This material is bottled under compression and if broken may cause injury to the eyes.
4. Disengage the plug of electrical machines before doing minor repairs.
5. *Never* put the hands on the face when on duty, particularly in the region of the eyes.
6. Wash the hands adequately after treating each patient. This is not so simple as it sounds. There is more to washing the hands than a cursory flip under a faucet of running water.
7. Adhere to strict isolation technic when treating patients carrying infectious organisms.

I would like to discuss in more detail the last two precautions. As you all know, there have developed over the years several strains of staphylococci resistant to antibiotics and prevalent in hospitals.[12] The most virulent are the multiresistant staphylococcus aureus, phage patterns 44A and 80/81. At the University of Texas Medical Branch these organisms are considered work hazards. Personnel who become infected are kept off duty until cleared by the Infectious Disease Control (IDC) Clinic.[7] This time off is not considered sick leave. The employee remains on full pay, and the hospital provides the prescribed medication. When a positive report is received from the laboratory, an injury report, identical with the ones used to report an accident, is sent to the appropriate authorities. It is the concensus that correct washing of the hands is the most important single factor in preventing spread of these infectious organisms among patients and personnel.[1] We use Dial soap or Phisohex which contain hexachloraphene. Phisohex dispensers have been placed at all wash basins. I would like to give the hand washing procedure, because I believe it to be a safety measure not appreciated to the fullest extent. This modification takes less than one minute.

1. Moisten the hands with water. Apply Phisohex or soap.
2. Wash the back of the hands beginning above the wrist, or 1 inch above the contaminated area, and extending beyond the finger tips—5 times each.
3. Interlace the fingers, and with a twisting movement wash between the fingers. At the same time extend over the tips of the thumbs—10 times.
4. Place the hands back to back, interlace fingers and fold hands over them. Repeat twisting movement and cleanse the finger tips—10 times.
5. Wash down the sides of each finger nail with thumb and finger—1 time.
6. Rinse hands by allowing water to flow from wrists over finger tips. Pat dry.
7. If forearms are included, wash them *after* washing the hands. Wash the posterior and anterior surfaces of each forearm—5 times each. Rinse by letting the water flow from the elbow over the forearm and hand.
8. Repeat numbers 1, 2, and 3. Rinse hands and pat dry.
9. Apply hand lotion.

What about handles of faucets and knobs on hand dispensers for Phisohex? Rub Phisohex or soap on them at the beginning of the routine, but consider them as "dirty" areas. Use a dry paper towel to turn off the faucets.

One of the recommendations of the IDC Committee was that no patient with antibiotic resistant organisms be deprived of treatment essential to his recovery. Therefore, burned patients must continue to be brought to the physical therapy department for the full immersion bath. An isolation procedure has been worked out whereby patients are transported on stretchers from the isolation ward to the department in such a way that there is no risk to others.[13] Upon entering the hydrotherapy room, isolation technic is continued. After each treatment, detailed cleansing measures are carried out on all equipment. Laboratory tests on swabbings from the

tank and equipment have shown satisfactory medical asepsis since the following procedure has been used.[10] The tank, agitators, and hoist are washed with Dreft suds, rinsed, then wiped with 3 per cent O-Syl solution which is left on at least 5 minutes before refilling the tub. The stretcher is wiped with O-Syl solution, and the canvas litter cover is changed on the stretcher frame after each patient. Linen used in the hydrotherapy room is classified as "contaminated."

I have gone into a rather detailed account of this, because it is evident that multiantibiotic resistant staphylococcus aureus represents a new safety hazard, which if not controlled will cause more loss of time from work than any other single factor, and in some instances may even prove fatal. It is also an increasing hazard of hospitalization.

Persons who accompany patients to a department must be considered in safety practices. Hospitals and clinics are liable for injuries to visitors if negligence can be proved. Some precautions in this situation are as follows:

1. Do not allow aimless wandering through the department.
2. If it is necessary for someone to accompany the patient into the treatment area, seat them.
3. If a parent, or ward personnel must be in the area where a patient with an infectious organism is being treated, they must observe all routine procedures of isolation technic.

What about the student doing clinical practice in a physical therapy department? Each situation varies according to the regulations of the particular school of physical therapy and the clinical practice facility concerned. For the most part, however, the clinic or hospital participating in the program provides emergency care. Student health or a comparable provision takes over upon the transfer of the student back to his school. The facility is responsible for the patient since the student's work with patients is supervised by physical therapists of the facility.[3]

Reporting of accidents,[4] and immediate medical care are of utmost importance. Most institutions have a form which shows the nature of the accident, the immediate care, and the disposition of the case. If there is no such procedure required in your particular facility, you should send in an essay type report. Verbal recollections, at best, are poor; neither do they command the respect of the jury regarding a true account of the circumstances.

Accidents do not occur with premeditation. A good relationship with the patient, beginning when he first enters the department for treatment, will pave the way to understanding if there is an accident. The patient who thinks everyone is doing their best for him is not the patient with a punitive attitude. Orientation of new personnel, sympathetic guidance and counseling when they have made mistakes will lead to understanding on their part if they should suffer from an error on the part of the institution.

I believe that equipment, although inanimate, has a right to safe practices for two reasons, (1) as a protection against harm to humans, and (2) to decrease the rate of depreciation and add to the life of the equipment. Safety for equipment is known as "preventive" maintenance. There should be an awareness on the part of all personnel regarding this. Periodic check-ups and inspection will help, but it is the ever watchful eye that is the most effective. When a screw is found to be loose, tighten it immediately. When an electrical connection is frayed, repair it. When a bolt or a washer is found on the floor, locate the equipment from which it fell and replace it. Keep movable parts oiled. By all means, do not force the movement of any mechanical part. Much equipment is broken by a display of "brute" strength, because of lack of appreciation of the delicate adjustments in good machinery. All too frequently, physical therapists and auxiliary personnel working in a hospital or clinic have no idea of the original cost of equipment, or the cost of upkeep and repairs. It comes as a surprise to learn that the small clamp which holds the directors on a microwave machine, broken because of too much force in the wrong directions, costs $6.25 to replace. Being sorry after breakage, although commendable, is not a substitute for being careful and preventing breakage.

Sooner or later, an emergency situation will arise in an active physical therapy department. Sterile hypodermic syringes and needles, and vials of stimulants should be on hand. The location of readily available oxygen tanks should be known. Sugar or candy should be on hand if patients on insulin therapy or treatment come to the department. Fire drills with routines for evacuating ambulatory, wheel chair and stretcher patients, attendants, visitors, students, and departmental personnel should be regular practice.

Safe practices in a physical therapy department may well extend into the homes of physically handicapped persons who frequently need assistive devices to compensate for motor or skeletal deficiencies, or who have little reserves with which to meet emergency situations. Strategically placed hand holds attached to the walls, widened doors, nonskid wax, elimination of rugs,

and specially designed furniture tailored to meet the needs of the individual patient will promote safety in the home. Furthermore, such careful "follow through" will aid materially in weaning the patient from supportive help and lead to independence.

A spot survey was done to determine a sampling of the types of safety hazards encountered in typical physical therapy departments and to learn how accidents were handled. The number of facilities contacted was too small to provide sufficient data for statistical analysis. However, there was enough information to show trends.

ACCIDENTS

Patients—54%		Personnel—43% Students—3%	
Type	*Percentage*	*Type*	*Percentage*
Burns	37	Back strains	44
Fractures	16	Contusions	19
Lacerations	16	Staphyloccoccus aureus phage pattern 80/81	12
Contusions	10	Freak accidents*	25
No injury	21		

* Eye injury following breakage of ethyl chloride bottle.
Traumatic synovitis of sternoclavicular joint when telephone receiver slipped out of soapy hands.
Loss of voice due to hematoma in larynx following a fall against the edge of a stretcher.
Miscarriage following a blow to the abdomen while treating a spastic patient.

CAUSES OF ACCIDENTS

Type	*Percentage*	*Type*	*Percentage*
Falls	31	Explosions of infrared bulbs	6
Faulty body mechanics	17	Questionable prescription	6
Poor technics	8	Poor risk	3
Carelessness	8	Freak accidents	9
Contact with patients	6	Faulty equipment	6

Immediate medical care was provided by all facilities. Accident forms were filed with appropriate authorities. Many facilities were covered by insurance or Workmen's Compensation. There had been law suits, but for the most part, accidents were satisfactorily resolved by:

1. Prompt medical attention.
2. Explanation of the nature and cause of the accident.
3. Facility assuming responsibility for medical expenses.
4. Sincere concern on the part of the departmental personnel and administrators of the facility.
5. *Preexisting good relationship.*

The following suggestions were made for the prevention of accidents and the enhancement of safety.

1. Promptly orient patients and staff when they are admitted, or first employed;
2. Patients must be constantly supervised by qualified personnel when undergoing treatment;
3. Proper precautions and instructions in handling of patients must be given to nonprofessional personnel;
4. Secure patients on treatment tables, stretchers, and chairs when indicated;
5. Give physical therapies only upon a prescription signed by the referring physician;
6. Keep accurate progress notes;
7. Observe isolation technic when necessary;
8. Practice good body mechanics;
9. Eliminate safety hazards;
10. Keep equipment in good repair—weekly maintenance check;
11. Do not stand on unstable supports;
12. Review accidents immediately in the light of what may have been the cause;
13. Have periodic inspection of all areas in the hospital by a committee made up of employees from different departments. Report of findings should be sent to all supervisors who, then, will take them up with department members;
14. *Be on the alert.* Remember, that just because it has never happened to you is no sign that it will not!

SUMMARY

Safe practices in the physical therapy department in relation to the patient, the physician, departmental staff, students, and hospital administrators have been discussed. Different methods of reporting accidents have been given. Suggestions for the immediate handling of accidents and for establishing good relationship with patients and personnel to prevent unpleasant repercussions have been made. The hazard of antibiotic resistant staphylococcus aureus has been presented. Recommendations for preventing accidents and enhancing safety have been listed.

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Paralysis of the Shoulder Subsequent to a Comminuted Fracture of the Scapula:

*Rationale and Treatment Methods**

Rachel L. Nunley, M.A., and Sara J. Bedini, B.S.

Fractures of the scapula are relatively rare and for the most part are not complicated by neurological involvement. This paper is based upon our experience with one patient who suffered paralysis as a result of a fracture of the scapula. The relevant information is presented to bring out several points of interest in regard to the methods of treatment employed and their rationale. These include:

1. Neurological deficit subsequent to a fracture of the scapula
2. The value of utilizing pattern technics in neuromuscular reeducation in lieu of isolated muscle technics
3. The value of cold packs in minimizing pain

The anatomical relationship of nerves to the scapula in the shoulder girdle region is of interest here. Neurophysiological mechanisms basic to the clinical procedures used in the treatment of the patient will be discussed.

History and physical examination

A 43 year old obese male was admitted to the emergency room on Feb. 10, 1958, with multiple injuries which were the result of an accident in which he was thrown from his truck. There was no loss of consciousness. He immediately noticed he could not move either leg, had severe pain in the back at the right posterolateral thoracic region and pain in the right shoulder. Examination revealed marked tenderness of the right supraclavicular area, tenderness of the right side in the posterior axillary line, and complete sensory and motor loss from the inguinal ligament caudad. Active flexion and extension of the right elbow was possible but the patient could not move the shoulder without severe pain. X-ray films of the right shoulder revealed a comminuted fracture of the superior border of the scapula, marked separation of the acromioclavicular joint, and fracture of the body of the scapula (Fig. 1). There were compression fractures of the bodies of the eleventh and twelfth thoracic vertebrae; fractures of the seventh, eighth, and ninth ribs posteriorly and fractures of the transverse processes of the first, second, and third lumbar vertebrae.

Treatment course

The patient was placed on a Foster Frame and transferred from the emergency room to a hospital ward. Physical therapy was instituted 16 days after admission and consisted of passive range of motion to the lower extremities and resistive exercise for the left upper extremity. One week later exercise for the right elbow, wrist, and hand were included in the treatment program. At this time range of motion and muscle strength were evaluated. Range of motion was complete in these joints and muscle strength

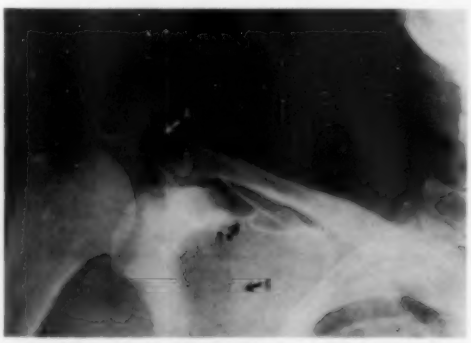

Figure 1. X-ray film of the right shoulder showing:
A. acromioclavicular separation
B. comminuted fracture of the superior border of the scapula
C. longitudinal fracture of the body of the scapula

Miss Nunley, Instructor, Section of Physical Therapy, School of Medicine, University of North Carolina, Chapel Hill; Miss Bedini, Staff Physical Therapist, Department of Physical Therapy, North Carolina Memorial Hospital, Chapel Hill.

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Figure 2a. Voluntary attempt to flex the right shoulder.

ranged from P— to G. Approximately six weeks after admission, motion was started in the right shoulder. There was no active motion and all movements were accompanied by severe pain. The patient's program was progressed during the following three months to include tilt table, mat activities, transfer work, parallel bars, and crutch activities. The patient was discharged in May, 1958, and continued physical therapy daily as an outpatient.

The progression of activity was hindered by the limited function of the right shoulder. To illustrate the complexity of the problem the following examples are cited:

1. Transfer activities were difficult because of the pain in the right shoulder and lack of support in that extremity.
2. Mat activities were limited as the patient could not do four-point kneeling balance, heavy resistive exercise, or activities involving elevation of the right arm.

Figure 2b. Voluntary attempt to abduct the right shoulder.

3. Balancing and crutch walking were hampered by lack of support and fatigue of the right upper extremity.

There was marked atrophy of the right deltoid and supraspinatus. Figures 2A and 2B show the limitation of motion when the patient attempted flexion and abduction of the right shoulder. In view of the difficulty the patient had executing elevation of the right arm, the right upper extremity was reevaluated on June 11, 1958. At this time the muscle strength and joint ranges were as shown in tables 1 and 2. There was pain in the region of the deltoid bursa when the arm

TABLE 1

Range of Motion of Right Shoulder

MOTIONS	MARCH 1958	JUNE 1958	JULY 1958	
Forward Flexion	15° P.*	35° P.	95° P.	15° A.*
Abduction	25° P.	50° P.	70° P.	15° A.
Ext. Rotation	10° P.	75° P.	90° P.	80° A.
Int. Rotation	10° P.	15° P.	25° P.	20° A.
Extension	10° P.	FULL P.	FULL P. and A.	

* P - Passive
* A - Active

TABLE 2

Muscle Strength of Right Upper Extremity

MUSCLE	MARCH 1958	JUNE 1958	JULY 1958
Anterior Deltoid	*	O	T
Middle Deltoid	*	O	T
Posterior Deltoid	*	T+	P+
Pectoralis Major			
Sternal Head	*	F	G-
Clavicular Head	*	O	O
Triceps	P-	F-	G
Latissimus Dorsi	*	F+	G
Rotators			
External	*	G	G+
Internal	*	F-	F-
Pronators	F	F+	G+
Upper Trapezius	*	N	N
Middle Trapezius	*	N	N
Lower Trapezius	*	G	N
Rhomboids	*	G	N
Biceps	F+	G	N
Brachioradialis	F	G-	N
Wrist Flexors	F+	G	N
Wrist Extensors	F	G-	N
Finger Flexors	F+	G	N

* Immobilization of the right shoulder precluded testing at this time.

was passively flexed to 35 degrees and abducted to 50 degrees. Generalized weakness was present in the entire extremity. The program of treatment was changed (from isolated muscle reeducation and passive stretching) and carried out for one month utilizing the application of ice packs to minimize pain, and brushing technics and neuromuscular patterns for strengthening. The patient and his wife were instructed in the application of ice packs and stretching technics which were carried out at home; parallel bars were built at home in order to supplement his visits to the physical therapy department. Gait training and more advanced activities of daily living were also included in his daily program.

A reevaluation on July 14, 1958, indicated remarkable progress in increase of range of motion and strength (Tables 1 and 2). The patient was able to transfer from his wheel chair to the bed, to an automobile, or to any couch or chair, as well as to get into and out of his wheel chair unassisted. He could walk longer distances without fatigue of the right upper extremity.

Discussion

Fractures of the scapula are uncommon, comprising less than 1 per cent of all fractures, and fractures of the scapular body, especially the upper part, are extremely rare.[1] A review of the literature reveals that fracture of this bone results from a severe direct blow and is usually accompanied by multiple fractures of the spine and ribs.[2] There is little tendency for displacement and treatment consists of rest and support of the arm in abduction until healing has taken place. Findlay[3] states that fractures of the scapula are relatively unimportant but this does not hold true in this particular case.

Anatomy of the shoulder

A review of the anatomy of the shoulder girdle shows the relationship of important nerves to the scapula (Fig. 3). The components of the brachial plexus pass anterior to the ventral surface of the scapula. The upper portion of the brachial plexus particularly is in close proximity to the superior border of the scapula. The suprascapular nerve passes through the suprascapular notch and is distributed to the supraspinatus and infraspinatus muscles. The thoracodorsal nerve to the latissimus dorsi, and the axillary nerve to the deltoid, branch from the posterior cord which has a contribution from the upper trunk. The lateral anterior thoracic nerve with contribution primarily from the upper trunk usually innervates the clavicular head of the pectoralis major.

It is conceivable that trauma severe enough to comminute the superior border of the scapula and result in multiple fractures of other bony structures could also result in damage to those components of the brachial plexus lying just ventral to the bone. A reference to figure 1 shows that impairment of the suprascapular nerve could have occurred in the comminuted fracture of the superior border over which this nerve passes. Haymaker and Woodhall[4] state that the axillary nerve is occasionally involved in fractures of the scapula. Contusion and/or compression of components of the brachial plexus could account for generalized weakness of the muscles in the distal portion of the extremity. Specific injury to the anterior branch of the axillary nerve and the anterior thoracic nerve would result in paralysis of the muscles innervated by these nerves.

Rationale of treatment methods

A comparison of the improvement in strength and range of motion for the three months' period in which isolated muscle technics and passive stretching were utilized, with the results obtained in one month using reinforcement technics and active stretching, is indicative of the effectiveness of the latter method. A mass effect of excitation is seen in the phenomenon of facilitation which is a central mechanism. An afferent stimulus may

be too weak to raise the central excitatory state of the motor neurons to a sufficient level in order to discharge. However, by "bombarding" the motor neurons with afferent impulses from a variety of sources the central excitatory state can be increased.[5] The centers are then capable of discharging at their own rhythm and grading their responses through the impulses which they receive. The intensity of muscular response depends on the number of neuromuscular units activated and the *frequency* and *strength* of their discharge.

The mechanism of gradation of response depends on the degree of voluntary effort. Weak effort is accompanied by low discharge frequency of the neuromuscular unit (2 to 30 per second), while moderate to strong effort is accompanied by high discharge frequency.[6] The reactivity of the neuromuscular unit is known to be dependent to a great extent upon influences originating in the muscle. The identification of the centrifugal control of the neuromuscular unit spindle by the efferent gamma fibers has opened a new field of exploration of both theoretical and practical importance for the understanding of the function of muscle. Minute changes in length or tension of the muscle affect the activity of the neuromuscular unit.[7] The gamma fibers of the motor nerves in the muscle innervate the muscle spindles. It has been shown that in the absence of normal inflow from the spindles, the motor neurons of the cord may not be sufficiently excited to be fired off by impulses coming from higher centers of the nervous system.[8] From this it seems apparent that the discharge frequency in one system alone may not be sufficient to result in a muscular contraction unless there are additional factors to determine the number of neurons available for firing. These additional factors increase the level of excitability and elicit or reinforce a muscle contraction.

Brushing

One of the technics for reinforcement which has received some attention is that of rapid stroking over the muscle belly. Unfortunately there is little in the literature regarding the execution of or rationale for this technic. Although there is some good support for this procedure, there are investigators[9] who believe that this technic should be more closely evaluated in regard to the clinical efficacy.

Skin and muscle are functionally integrated so that muscle is excited by stimuli from a related skin area. The areas of sensory perception are extremely variable, both in size and degree of overlap.[10] Hagbarth[11] in studies of excitatory

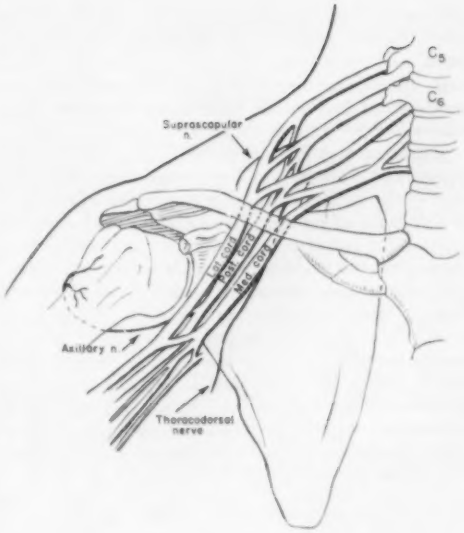

Figure 3. Schematic drawing showing the relationship of the brachial plexus to the scapula.

and inhibitory skin areas pointed out that muscles are excited when the skin area over the muscle belly is stimulated. Tactile stimulation of the afferents from a skin area covering a certain muscle will elicit or reinforce contraction of the muscle and reciprocal inhibition of its antagonist. The reflex effect from sensory organs on muscle supports the thinking that the amount of reflex contraction is a function of *input* frequency.

It has been shown that around active neurons which fire into a muscle there is a large fringe of subliminally excited units which fail to be activated by the natural stimulus. There is evidence that eddy currents from an active region of the nerve are able to increase the excitability of adjacent fibers.[12] Increasing the number of neurons firing and the frequency of the discharge determines the central effect in terms of output. Rapid brushing of the skin surface increases the excitability of the motor neurons and by irradiation brings more neurons into activity.

Patterns of movement

During the period of time immediately following the brushing, unilateral and bilateral neuromuscular patterns and resistance were used to further reinforce contraction. To obtain the maximum output from a muscle, the resistance must be adjusted in every stage of shortening so that the muscle is just able to overcome it.[13] This im-

plies that resistance *must* be used to get maximum work from a muscle. The physiological mechanisms underlying the use of contralateral exercise, neuromuscular patterns, and resistance as methods of facilitation have been discussed elsewhere.[14, 15, 16, 17]

Evidence has been presented by neurophysiologists and neuroanatomists[18] supporting the concept of the pyramidal and extrapyramidal systems functioning as *one* physiological unit involved in purposeful patterns of movement and not as two separate systems. There is little evidence to support the mosaic theory of isolated muscle function; rather evidence supports the theory of multiple representation of movements in the motor cortex.[19, 20] It is known that muscles acting together in a synergistic pattern of movement reinforce each other. Active contraction of a muscle, especially against resistance, evokes through proprioceptors activation of other muscles in the same synergy.[21]

Use of cold and active stretching

The primary purpose of using ice packs was to minimize pain so that a greater range of motion could be achieved.[22] Packs of ice and water at a temperature of 45 degrees F. were applied to the lateral superior aspect of the right shoulder for 5 minutes, being changed frequently to maintain the cold. Locally applied cold acts as a local anesthetic to relieve superficial as well as deep seated pain. Lowering the temperature of nerve slows the conduction rate of impulses which is important in the breaking up of the pain-spasm chain.

Shoulder pain arises chiefly from two sources. It can be caused by postural or gravitational stress which is mechanical, functional, and referred; or it may be the sequela to specific disease or injury associated with loss of glenohumeral motion.

It has been pointed out that the empirical use of forms of heat in the treatment of pain is not good therapy[23, 24] and frequently results in the magnification rather than the alleviation of symptoms. There are other factors to be considered such as fatigue and poor muscle tone. Cold acts as a stimulant, reducing the fatigue element and improving muscle tone.

Pain is one of the greatest obstacles to stretching since the patient will contract the muscles necessary to prevent further movement when pain is elicited. The involuntary component of passive stretching is the myotatic reflex. The muscle (one in full connection with the nervous system) will actively resist an extending force by virtue of stimulation of the muscle spindle. Stretching obviously is more effective if the pain factor is minimized and lengthening of the muscle can be achieved without eliciting reflex contraction.

The technic used in stretching was to move the extremity to the point in the range where tightness occurred. The patient was then asked to contract in the direction of the tightness (contraction of the tight muscle). The therapist gave an equal amount of resistance so that no movement occurred (isometric contraction). Having obtained a *maximal* contraction, the patient was asked to relax and when he had done so the therapist further increased the range of motion, and the procedure was repeated. This technic must be done slowly in order to obtain a maximal contraction and to give the patient time to relax before increasing the range of motion. This is the technic of contract-relax as described by Knott and Voss.[25]

Active stretching technics are of greater value and less painful than are passive stretching methods and basically involve two procedures: (1) activating the antagonists of the tight muscles, and (2) activating the tight muscles. The first technic is based on Sherrington's law of reciprocal innervation which states that when the agonists contract there is an equivalent degree of lengthening in the antagonists. This is an oversimplification of the law but nevertheless conveys the basic premise. The second technic is probably based on the principle of autogenic inhibition (an inhibitory effect set up in the muscle by activity initiated in the muscle itself). Active contraction can stimulate certain receptors in the muscle which results in inhibitory restraint of the motor neurons.[21, 13] The source of the inhibitory impulses is not definitely known but several investigators have postulated theories.[9, 26, 13]

The separate processes of stretch and contraction result in facilitation; however, the *combination* of stretch and contraction provoke *inhibition*.[26] The amount of inhibition increases with two factors: (1) the muscle tension (strength of contraction) and (2) the degree of stretch. A sustained maximal contraction of a stretched muscle produces a powerful central inhibition of the neurons controlling the muscle.[9] The inhibitory effect is not only present in the motor units of the primary muscle being stretched, but also has a slight effect over the motor units of muscles of related function.[13]

Passive methods of stretching for the most part are the conventional clinical technics for increasing range of motion regardless of the status of the muscle. This technic is based on the premise that if a muscle is tight (short), one has but to increase the distance between

the origin and insertion by manually lengthening the muscle in order to increase the range of motion. This premise is not only erroneous but as pointed out in the foregoing evidence frequently defeats and/or impedes the purpose for which it is intended. Passive stretching is primarily indicated in situations where muscles in the same synergy are denervated. Manually lengthening a muscle with intact innervation stimulates the muscle spindles and results in a reflex contraction.

SUMMARY

Fractures of the scapula are rare and usually uncomplicated: however, neuromuscular weakness and paralysis can occur subsequent to a fracture and severe trauma. The response to treatment by the patient whose case history is cited indicates that:

1. Increase in range of motion and decrease in pain are markedly enhanced when cold packs are used in combination with active stretching.
2. Increase in range of motion and muscle strength are greatly enhanced by the utilization of reinforcement technics.
3. In the presence of muscular weakness and marked limitation of shoulder function, a patient is capable of doing transfer activities and an elevation gait with crutches.
4. There is an obvious need for investigation and revision of thinking regarding the principles (or the absence of principles) underlying many of our so called "accepted" or "conventional" clinical technics.

NOTE: A 34 year old female patient was admitted on Dec. 25, 1958, following an automobile accident. She had fractures of five ribs posteriorly, bilateral pneumothorax, a partial cord transection and resulting paraplegia below the level of the sixth thoracic vertebra, and a severely comminuted fracture of the left scapula. This patient has generalized weakness of the left upper extremity but no specific paralysis. All muscle grades are at least F plus.

We wish to express our sincere appreciation to Dr. Richard L. Glasser, Assistant Professor of Physiology and Dr. Price A. Heusner, Professor of Anatomy for their comments and criticisms relevant to certain aspects of this paper.

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A Survey of the Work Load in Physical Therapy

James Zimmerman, B.S., and Ernest W. Johnson, M.D.

Since there is a wide discrepancy in the estimates of the optimal number of patients who can be treated by a physical therapist during one work day, we undertook a survey to shed light on this problem. Because the analysis of the work load in a physical therapy department depends many times on the type of patient treated as well as the philosophy of the hospital administration, we felt a sample including 10 large hospitals in metropolitan areas in Ohio would provide us with a relatively accurate estimate. Although we did not expect to compare the efficiency of these departments, we hoped to establish certain ranges of achievement which might be projected to other departments serving similar types of patients. This could provide a guide for administrators and supervisors when establishing new physical therapy departments.

Mr. Zimmerman, Administrative Assistant, Children's Hospital, Columbus, Ohio; Dr. Johnson, Associate Professor and Director, Division of Physical Medicine and Rehabilitation, College of Medicine, Ohio State University.

Method

Ten Ohio hospitals were sent questionnaires with an accompanying letter. The following requests were made. (1) Do you keep a record of the number of modalities used in your department each month? (2) List the names of the modalities you use. (3) Do you keep a record of the total patient treatments or visits per month? (4) List the number of times all modalities were used in your department each month in 1958.

TABLE I. MODALITIES LISTED BY EIGHT PHYSICAL THERAPY DEPARTMENTS

Eight Listed:	*Exercise	Electrical Stimulation
	Radiant Heat	Massage
Seven Listed:	Shortwave Diathermy	Ultrasound
	Paraffin Bath	Ultraviolet
	Hot Moist Packs	Whirlpool
	Gait Training	
Six Listed:	Traction	Muscle Test
Five Listed:	Microwave Diathermy	Hubbard Tank
	Moistaire Cabinet	
Four Listed:	Tilt Table	
Three Listed:	Home Instructions	
Two Listed:	Functional Training (ADL)	Pool
	Contrast Bath	Rehabilitation
Listed Once:	Electromyography	Skin Temperature Test
	Electrical Test	Equipment Check
	Iontophoresis	Bennett Positive Pressure
	Vital Capacity	Joint Measurement
	Rhythmic Constriction	Pavaex Boot

*Two departments listed both exercise and PRE, One department listed stretch, mat and breathing exercise. One department listed muscle training, Buerger-Allen, Passive, active, active assistive, active resistive, forced and postural exercise.

TABLE II. AVERAGE NUMBER OF PATIENT TREATMENTS BY EACH PHYSICAL THERAPIST

	A	B	C	D	E	F	G	H	I	J
JAN.	321	228	443	217	439	191	197	150	232	204
FEB.	175	217	403	178	493	215	161	136	215	205
MAR.	248	222	472	197	564	242	175	159	245	206
APR.	273	202	414	209	466	189	185	145	229	215
MAY	249	-	378	216	420	195	195	157	234	214
JUN.	223	-	456	220	382	200	156	179	223	196
JUL.	280	-	206	248	389	226	163	187	244	187
AUG.	258	339	268	216	453	233	196	163	231	153
SEP.	231	169	319	218	403	203	272	146	239	152
OCT.	283	213	374	281	482	267	233	172	281	175
NOV.	200	230	299	231	437	203	164	131	223	128
DEC.	199	289	283	201	522	266	171	126	251	165
TOTAL	2940	2109	4315	2632	5450	2630	2268	1851	2847	2200
MONTHLY AVERAGE	245	234	360	219	454	219	189	154	237	183

Mean - 250 Median - 220

(5) List the total number of patient treatments for each month in 1958. (6) List the number of physical therapists working in your department each month. (7) List the approximate case load the supervisor carries.

Selection of the 10 hospitals surveyed was based on three factors. First, the professional staffs of the physical therapy department were known to the authors. Secondly, the hospitals represented five of the largest metropolitan areas in Ohio. Finally, the hospitals represented a reasonable cross section of Ohio hospitals with staff complements varying from 2 to 10 physical therapists and included general, pediatric, private, and municipal hospitals.

Of these 10 hospitals, eight were general medical and surgical, and two were pediatric. One hospital included both a tuberculosis unit and a respirator center, while another included a respirator center. Five departments have full time medical direction, three have part time medical direction, and two have no one physician designated as medical director.

The assembled information was evaluated by the following method. (1) The total number of monthly patient treatments for each department was divided by the number of physical therapists for each month. The figure obtained was the average number of patient treatments by each physical therapist per month. (2) The total number of modalities administered in each department monthly was divided by the total number of physical therapists each month. The figure obtained was the average number of modalities administered by each physical therapist per month.

In both of these calculations, part time therapists were counted as the appropriate fraction and supervisors were counted as full time, regardless of their case load. We felt that even though the supervisors carried no case load or less than a full load, their presence would increase the efficiency of the department's operation. If this premise is reasonable, the supervisor should be counted as a full time person.

When reviewing the results of the survey we recognized that another variable needed to be considered, that is, the ratio of modalities to patient treatment. This may provide some indication of the complexity of the patient treatments.

TABLE III AVERAGE NUMBER OF MODALITIES ADMINISTERED BY EACH PHYSICAL THERAPIST

	A	B	C	D	E	F	G	H
JAN.	412	317	675	838	1128	505	334	321
FEB.	225	336	685	709	1439	633	275	287
MAR.	339	381	750	756	1676	616	321	309
APR.	378	317	677	842	1499	502	321	312
MAY	310	360	681	921	1390	501	300	328
JUN.	322	-	715	897	1115	554	255	374
JUL.	327	-	298	916	1120	678	276	406
AUG.	309	-	351	759	1218	612	343	357
SEP.	385	325	487	882	1077	513	536	341
OCT.	372	327	668	1136	1788	719	541	443
NOV.	262	316	458	891	1416	554	389	310
DEC.	289	452	408	786	1485	766	381	289
TOTAL	3930	3131	6853	10333	16357	7153	4272	4077
MONTHLY AVERAGE	328	348	571	861	1363	596	356	339

Mean - 603 Median - 458

This figure was obtained by dividing the total number of modalities administered monthly by the total number of patient treatments given monthly in each department.

In analyzing these figures, we recognize that there are many other variables which may influence the results of the study. Some of these variables include: (1) the types of patients treated; (2) the types and number of modalities available; (3) the impact of a teaching program on the department; (4) the ratio of inpatients to outpatients; (5) the ratio of long term convalescent and rehabilitation patients to short term patients; (6) personnel policies such as length of vacation, number of working hours, and educational leave; (7) the number of nonprofessional workers assisting in physical therapy procedures; (8) staff experience; (9) hospital philosophy; and (10) seasonal variation.

RESULTS

Of the 10 hospitals surveyed, all completed and returned their questionnaires. All hospitals (100 per cent) keep a record of monthly patient treatments or visits. Eight, or 80 per cent keep a record of monthly modalities. One of the two not keeping a modality record keeps a list of conditions treated. The other keeps patient treatments only. The types of modalities used by the eight departments reported are tabulated in table I. Only exercise, heat in some form, hydrotherapy in some form, massage and electrical stimulation are listed by all eight. The number of modalities listed varied from 11 to 27 with an average of 18 and a median of 19.

In table II the average number of patient treatments by each physical therapist per month is given, and in table III the average number of modalities administered by each physical therapist per month is shown. In figure 1, the average number of modalities used for each patient treatment is shown.

DISCUSSION

The number of monthly patient treatments per physical therapist ranges from 126 to 564. The monthly modalities per physical therapist varied from 225 to 1,788. These extremes are much greater than we anticipated but probably can be

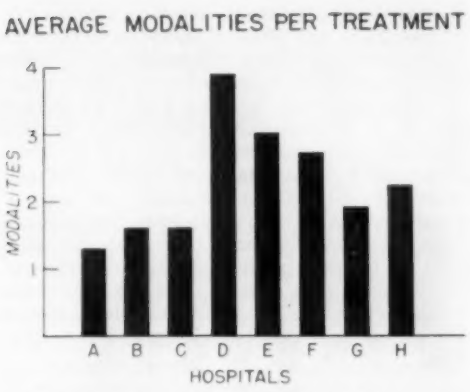

Figure 1. The average number of modalities used for each patient treatment shows considerable variation in the departments studied.

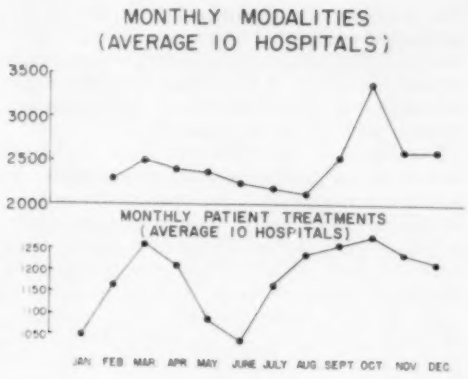

Figure 2. Graphs indicate October was the peak month for work load of the departments studied.

accounted for by the variables listed previously.

Certain observations can be made concerning these data. Teaching and pediatric hospitals all appear consistently in the lower 50 per cent, both in patient treatments and modalities per physical therapist. This might be expected since teaching and research responsibilities of the staff will reduce the number of patients which can be served. Pediatric physical therapy usally requires more of the therapist's time for comparable treatment. The hospitals in the higher patient treatment per physical therapist range represented large private hospitals with relatively short term patients.

There seemed to be no significance in whether or not the supervisor carried a patient load. In two departments the supervisor treated no patients, in four departments the supervisor carried a partial case load, and in four departments the supervisor carried a full case load. Since such intangibles as staff morale, inservice training, and public relations could not be judged in this study, there was no indication of the desirability of having the supervisor with or without a patient load.

It is of interest to note that the department listing the greatest number of different modalities (27) also had the highest monthly ratio (average 3.9) of modalities to patient treatment; whereas, the department listing the fewest modalities (11) had the lowest average (1.3) per patient treatment. We may speculate that some departments list fewer modalities for an equal amount of treatment time. An example is listing exercise alone instead of listing each separate type of exercise. One department listed eight types of exercise, another five. Since many patients could conceivably receive several types of exercise during one treatment, the itemizing of the treatment could be quite variable.

In this respect, several more problems arise: how modalities are calculated when more than one extremity or area is treated; whether treatments such as underwater exercise count as one or two modalities; and, more to the point, whether a modality record is used primarily to determine the treatment cost or a record of departmental work, or both. Here again, these variables force us to conclude that using the number of modalities to measure the work of a physical therapist or of a physical therapy department is probably deceptive.

Dividing the median of 220 monthly patient treatments per physical therapist, for all departments surveyed, by the number of work days averages to a daily patient load of 10.2 per physical therapist, whereas the mean of 250 averages to a daily load of 11.5. Both figures are well below the 15 patients per day mentioned by the American Hospital Association.[1] The significance of the median figure of 10.2 is that one half of the monthly case loads reported fell below this point as a daily work load per physical therapist.

It would be easy to assume that the facility with the highest number of patient treatments per physical therapist would have the lowest number of modalities per patient treatment, while the facility with the fewer patient treatments used more modalities, but this is not necessarily so.

For example, the department with the highest number of patient treatments per physical therapist had the second highest ratio of modalties to patient treatment. Explanation for this may be the same as discussed previously, that is, varying approaches to itemizing modalities.

One factor not surveyed, which may be important, is the ratio of outpatients to inpatients. As a rule, one could expect the inpatients to be more severely disabled and to require more assistance and thus, more therapist's time per patient treatment and per modality. Perhaps more consideration should be given to the study of time and its effect on the work volume. Time, however, should probably not be overemphasized in adjusting a fee schedule since there is such variability from day to day in working with long treatment programs and severely disabled patients.

One finding that was totally unexpected is the peak of work volume in October (Fig. 2). Six of the 10 departments had the greatest monthly number of patient treatments in October. In two departments it was the second highest month, in one it was the third, and in one it was the fourth. Of the eight departments reporting modalities, October was the peak month for six, the second for one, and the third for one. This certainly would be worth consideration when planning vacation schedules, staff needs and educational leaves. In one or two of the hospitals which treat patients who have had polio, this may represent the increased polio load in the autumn in Ohio. However, there were seven hospitals which did not treat a significant number of polio patients.

The data show considerable variability so that it seems inappropriate to use patient treatments or modalities per physical therapist to measure work performance alone. These may be included with other factors mentioned to provide a guide in estimating the work load of a physical therapy section. It is doubtful that any single common denominator to compare efficiency will be found in a variety of hospitals such as we have surveyed. We do feel that this study reflects a reasonable summary of the problems encountered when an attempt is made to evaluate the work load of hospital physical therapy departments. It may serve as a starting point for department heads, supervisors, and hospital administrators for gaging operational efficiency and for schedules.

CONCLUSIONS

1. In 10 hospitals surveyed the median and mean figures for monthly patient treatments per physical therapist are both below the range most often suggested as optimal for a daily case load of a physical therapist in a hospital department.
2. The data suggest that it is extremely difficult to project the expected number of patient treatments or modalities per physical therapist without a detailed study of patient population.
3. "Teaching" hospitals had fewer patient treatments and modalities per physical therapist than general hospitals.
4. For majority of the hospitals, the peak of the work load was in October.

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Book Reviewers for June

Gertrude Beard, Physical Therapist, Bethany Hospital, Kansas City, Kansas.

Miriam L. Bender, Major, USAF (MSpC), Chief, Physical Therapy, USAF Hospital Eglin, Eglin Air Force Base, Florida.

Beryl B. Bilderback, inactive member of the Association; formerly, Instructor, School of Auxiliary Medical Services, University of Pennsylvania; more recently, affiliated with the Wisconsin Neurological Foundation.

Mary Callahan, Director, Training Course in Physical Therapy, Training College of Physicians and Surgeons, Columbia University, New York.

Carmella Gonnella, Chief Physical Therapist, Texas Rehabilitation Center, Gonzales Warm Springs Foundation, Gonzales, Texas.

Virginia M. Greenwood, formerly Assistant Administrator, Boston Dispensary, Boston.

Mary McCurdy Replogle, former teacher, D. T. Watson Home, Leetsdale, Pennsylvania.

Irving Sherman, M.D., Professor and Chief of the Department of Neurology, Chicago Medical School.

Rachel F. Weems, M.D., Director of Physical Medicine, Woodrow Wilson Rehabilitation Center, Fishersville, Virginia.

*Electromyographic Kinesiology of the Hand: Part I. Method**

Mary Eleanor Brown, M.A., Charles Long, M.D., and Gerald Weiss, M.A.

This hand research was started on July 1, 1958, and will continue through June 30, 1960. The research team is composed of the authors, an engineering consultant, an electronics consultant, an electronics technician, an electroencephalograph technician, a secretary, a photographer, and a photographic technician. This paper presents the background information gathered and the method being used.

The purpose of the study is to delineate the sequence of contraction of the extrinsic and intrinsic muscles of the normal, moving hand: thereby to test and extend in detail the hypotheses of muscular control of the hand proposed by observers in the operating room and the dissecting laboratory. Three specific questions are asked: What is the sequence of contraction of extrinsic and intrinsic muscles as the hand moves? When do peak activities occur in time during hand motion? How are these contractions interpreted in relation to hand motion?

The method is to photograph the hand in motion, at the same time recording its muscular activity. Individual motion picture frames and simultaneous electromyograms are studied.

Kinesiologic and Electromyographic Background

The kinesiologic and electromyographic (EMG) background was assembled in four ways: review of past and present literature, consultation by correspondence, a research trip to four universities, and a concentrated period of dissection of the hand under the supervision of an anatomist.

Steindler,[1] Bunnell[2] and Eyler[3] have contributed detailed knowledge of anatomic relationships of muscles of the hand and have extrapolated some kinesiologic conclusions. Combined cinematographic and electromyographic studies have not previously been applied to the hand. The experimental method has been firmly established by Inman[4-6] in his fundamental studies on the shoulder[4] and locomotion[5, 6] and by Marks[7] on hemiplegic gait. The EMG method has been applied to the muscles of respiration by Koepke[8] and to the elbow musculature by Basmajian.[9]

Bunnell is quite concise in stating a theory of extrinsic-intrinsic balance. In general when the metacarpophalangeal (MP) joints are flexed or semiflexed, he implicates the extensor digitorum[10, 11] (formerly extensor digitorum communis) in all extension movements at finger joints. He further indicates that, in MP flexion, slackening of the intrinsic attachments decompensates these muscles from any action except flexion at the MP joints. Only when the MP joints are in extension, is extension at the distal and proximal interphalangeal joints postulated to be performed by the intrinsic muscles.

Some specific findings have resulted from intensive pinpointed studies by some observers. Backhouse and Catton's[12] exhaustive EMG and stimulative studies of the lumbricales indicate strongly that these muscles are not active in flexion at the MP joints regardless of their position. Eyler and Markee[3] postulated, on the basis of extensive anatomic dissections, that, in extension of the finger, the palmar interossei would in general prove of more importance than the dorsal, due to their predilection to extensor mechanism attachment. Dorsal interossei predispose to bony attachment and hence are most effective in lateral deviation of the fingers, with the exception of certain dorsals which have extensor mechanism attachments. Lake[13-15] produced a doctoral thesis based on anatomic dissection and EMG studies matched with still pictures. She provides further evidence that bony attachment precludes the use of certain interossei for extension movements. She further suggests the "antagonistic" co-contraction of some muscle groups during the active phase of contraction of certain prime movers. This relationship can best be noted in the balance between extensor digitorum and flexor digitorum superficialis[10, 11] (formerly flexor digitorum sublimis).

This study is being conducted at Highland View Hospital, affiliated with Western Reserve University, and is being supported in part by The National Foundation through a grant to Western Reserve University.

Miss Brown, Chief Research Associate; Dr. Long, Principal Investigator; and Mr. Weiss, Second Research Associate.

* Presented at the Annual Conference of the American Physical Therapy Association, June, 1959.

The writings of these observers and many others in recent years are gradually evolving a "neoclassical" theory of hand kinesiology. Its basis is the total synchrony of function of separate segments. We have thought that deeper investigation of hand function would show that most of the muscles were working most of the time. This would be consistent with Inman's[4] findings in the shoulder, findings which laid to rest, among other ideas, the thought that the supraspinatus initiates shoulder motion.

We are centering our study on the middle finger, because its length allows best visibility and its intrinsic musculature is most evenly balanced. Our greatest concern is with two sets of muscles: (1) extrinsic long tendon muscles, reaching from arm and upper forearm, to the two end phalanges of the fingers; and (2) intrinsic muscles in the metacarpophalangeal region—the lumbricales and interossei. All the lumbricales and interossei attach together with one extrinsic muscle, the extensor digitorum. The lumbricales attach also to another extrinsic muscle, the flexor digitorum profundus. The lumbricales have no bony attachment, each being slung between a long finger flexor and a long finger extensor. Our field of study is thus narrowed to focus upon the following 13 muscles: flexor carpi ulnaris, flexor carpi radialis, palmaris longus; extensor carpi ulnaris, extensor carpi radialis longus, extensor carpi radialis brevis; the flexor digitorum superficialis, flexor digitorum profundus, and extensor digitorum of the middle finger; the second and third lumbricales and the second and third dorsal interossei.

During March and April, 1959, Carl Francis, M.D., Associate Professor of Anatomy, Western Reserve University, provided to the Chief Research Associate 52 hours of dissection with instruction. This was followed by a review and summary with Dr. Long after the hand muscles had been dissected but before their disengagement, with particular emphasis upon the exploratory design of the project.

Collecting the Data

By June, 1959, 10 fully instrumented laboratory experiments had been performed with subject, EMG and camera, in order to collect data for reduction purposes. The subjects are normal adult men and women. The total number is expected to be about 30 normal persons. For each subject an average of 300 feet of 16-millimeter motion picture color film are used.

The Grass Model III-D Eight-Channel Ink-Writing Electroencephalograph-Electromyograph was chosen because of its microvoltage sensitivity and its satisfactory pen response time. A copper-screened inner room constructed within the EEG-EMG Laboratory itself, electromagnetically shields the subject, electrodes, camera, lights, and necessary personnel from alternating current fields during the experiments. Camera floodlights used within the room have been changed to direct current, to eliminate alternating current interference from them. Our Cine-Special motion picture camera allows direct sighting through the lens and, with a synchronous motor, provides constancy of camera speed with an acceptable variation of only one/tenth of a frame per second.

Figure 1. Motion picture frame showing landmarked hand with white lines to indicate displacement angles for measurement.

The subject sits inside the copper-screened room on a chair with armrest, right upper extremity bent at the elbow, and pronated forearm placed on the armrest. Motor points of selected muscles are located by a TECA CD4 Low Volt Generator. Next, the hand and forearm (Fig. 1) are marked for best visibility for future measurement. The entire dorsal surface of the middle finger and of the corresponding metacarpal is painted with high visibility red paint. A flat 4 inch red stick is glued to the back of the distal part of the forearm. A red paper clip "wand" is taped to the back of the tip of the middle finger. This insures a view of the distal phalanx otherwise lost in a closed-hand position. Four X rays permit the study of markers in their relationship to the skeleton of the hand.

The camera, also inside the screen, is directed so as to take a continuous picture of the ulnar side of the moving hand. The limitless combinations of hand motions make it necessary to restrict this study to a single type of motion in the sagittal plane: opening and closing the hand. The subject opens and closes his hand, having been instructed to open the hand fully and close it until the fingertips touch the palm and then repeat the motion. These movements are per-

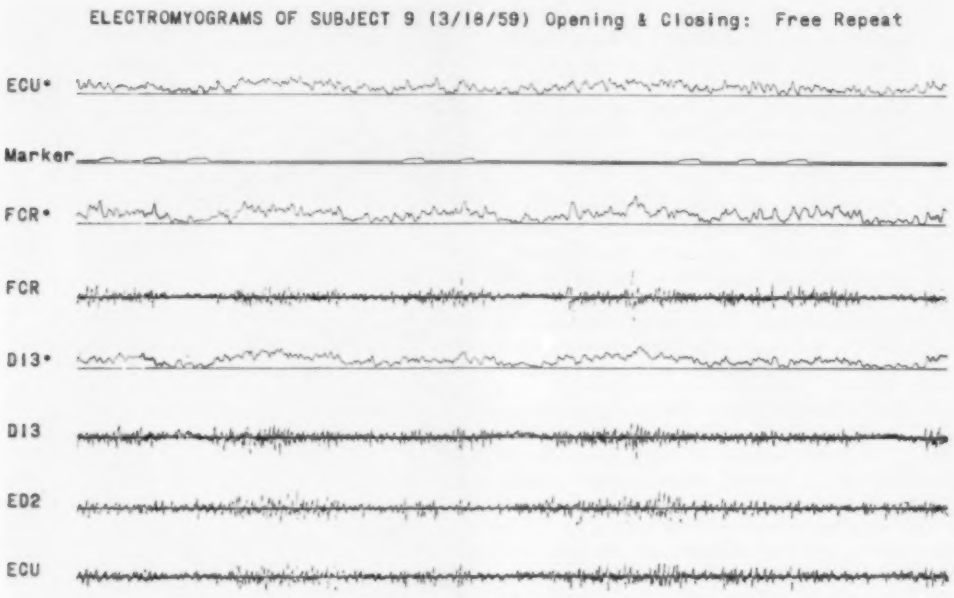

Figure 2. From the top down, Channels I, III and V integrate Channels VIII, IV and VI, respectively. Channel VII remains unintegrated. The light-marker synchronizer in Channel II serves also to signify a closed hand on its first mark in each series. By pointing the hand upward and moving it horizontally from left to right while opening and closing, it will be closed at the extreme left and open at the extreme right, having performed essentially three cycles. (The electryomyograms are of the following muscles: extensor carpi ulnaris (ECU), flexor carpi radialis (FCR), third dorsal interosseus (DI3) and extensor digitorum to the middle finger (ED2).)

formed with five variations in the following series: with unrestricted joints (Fig. 1); with fingers held flexed at MP joints; with fingers held extended at MP joints; with wrist joint supported by a splint; with unrestricted joints. The first and the last are the same. The reason for the last is in order to compare with the first for possible variations due to fatigue, training, or pain.

The electrodes are applied to the selected muscles, the EMG is set up, and we are then ready for the camera takes.

THREE EMG FACTORS

Three EMG factors approaching resolution during the first year of the study are: (1) recording electrodes, (2) the averaging device called "integrator," and (3) the light-marker synchronizer.

1. *Recording electrodes.* Our concern is the isolation of signals produced by a single muscle from those produced by the forearm or hand mass in general. A series of experiments is testing electrode pickups with a variety of electrode placements. These include the use of skin electrodes, single wire electrodes, double wire electrodes, and concentric needle electrodes, recorded against skin electrodes over the olecranon process, the distal end of the ulna, the muscle under observation or an indifferent ground supplied within the EMG machine. Specific wire electrodes were recorded against skin overlying the wire, against other wires within the same muscle, or by concentric needles to the barrel of the needle. We came to the following conclusions:

a) When a distant nonspecific electrode is used as a reference point, similar electromyograms are recorded from most of the tested muscles. The EMG's in figures 2 and 3 were recorded with skin electrodes against the olecranon process.
b) The pattern of electromyographic output is

affected by the distance between specific and nonspecific electrodes. When recording is made between an inserted wire and an immediately overlying skin electrode, electromyographic patterns can be obtained which are grossly different from those obtained against a distant nonspecific electrode.

c) Potential spread within the forearm is of such significant magnitude that recording from the skin over either the olecranon process or the distal end of the ulna against a nonspecific ground shows rhythmic "electromyographic" recordings indistinguishable from those produced by recording over muscles with a distant reference point.

Subsequent to the above observations, we are now modifying our recording method so that distant reference points are never used. In superficial muscles we may record from two closely spaced skin electrodes. In deeper muscles we record between a single wire and overlying skin, or between two wires by the use of concentric needles or 37-micron wire.

2. *Averaging device called "integrator."* A further need is to know when action potentials build to a peak and when they drop off, comparatively speaking rather than quantitatively. Since we are interested primarily in phasic activity and not in volumetric or quantitative analysis of muscle voltages, we have adopted the wave-envelope writer (Fig. 2) as produced by a rectifier-filter, which is an averaging device called an "integrator." The purpose of the wave envelopes is to facilitate measurement of the EMG record and permit a clearer record for future data analysis. The integrator which makes these wave-envelopes is plugged into the desired channel in the power amplifier section of the EMG allowing the ink-writing pen to trace a smoothly undulating line above the isoelectric line. No EMG tracing is allowed to proceed under cover of an integrator unless it has first been monitored on a nonintegrated channel and found to be free of significant artifact, or is being continuously monitored.

3. *Light-marker synchronizer.* Since the EMG must be accurately related to the motion pictures, we must be certain that we match the correct pages of the EMG record with the strip of film containing the cycle measured. The EMG's are presently being synchronized with the motion picture by a light-marker synchronizer. This device causes the pen in the channel containing it to leave the line producing a time artifact (Fig. 2), at the same time flashing a bright light in the camera field. The pen upsweep on the EMG record is matched to the first frame in which the light appears.

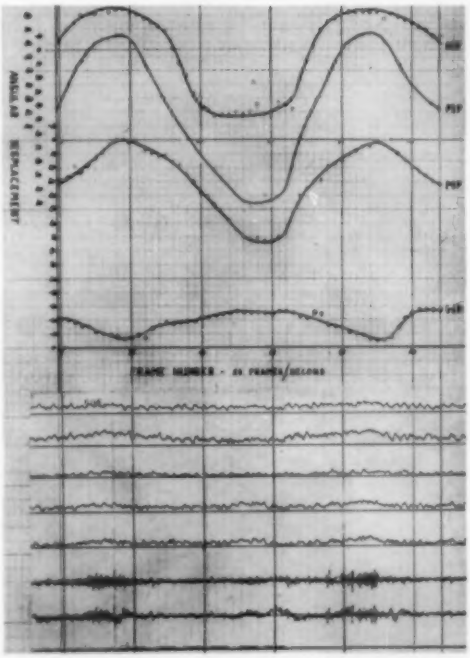

Figure 3. Displacement curves and electromyograms during opening and closing of hand with unrestricted joints from the records of Subject 7 (J.P.) 12/12/59. The four displacement curves from the top down are of the distal phalanx at the distal interphalangeal (DIP) joint, the middle phalanx at the proximal interphalangeal (PIP) joint, the proximal phalanx at the metacarpophalangeal (MP) joint, and the metacarpus at the wrist (WR) joint. The EMG's from the top down are of the following muscles: ECR, ED2, FDS2, FCR, DI2 and DI3. (The top five channels are integrated, and the next two unintegrated. The marker in the bottom channel was actuated on complete opening.)

Reducing the Data

The film is viewed and from each movement variation one complete cycle of opening and closing is chosen. Every other frame is projected onto an opaque surface. With the benefit of the landmarks, four key joints are measured: the wrist, metacarpophalangeal, proximal interphalangeal, and distal interphalangeal joints (Fig. 1). These joints are measured in degrees by a goniometer and read off consecutively by one person,

as another person plots each point on graph paper (Fig. 3). Four curves are made at once, each with its own baseline. The X axis provides for frame sequence, representing the passage of time. The Y axis records the number of degrees of flexion or extension, representing position. It is convenient to think of the hand pointing upward as it opens and closes, with the angular displacement curves flowing out of the moving hand, as they become located on the graph paper. For ease of visualization, ascending curves represent opening the hand and descending curves signify closing.

After the angular displacements are plotted, the corresponding EMG record is matched and affixed below it (Fig. 3). This procedure has been made certain and simple by two measures: (1) the light-marker synchronizer provides exact matching points on frame and EMG; and (2) the EMG paper speed of 60 millimeters per second allows exact matching with angular displacement curves which are plotted on the same time line basis. During the first 11 months of the study 47 similarly reduced cycles of opening and closing from 5 different subjects, representing the plotting of 15,000 points, have been recorded, labeled, and mounted on poster board.

An angular displacement curve gives a static record of changes at specific instants. Its first derivative, velocity, gives the average speed at which the change is taking place, filling in the time between instants. Its second derivative, acceleration, gives the amount of increase or decrease in velocity per unit of time. It answers the question: How fast is the velocity changing from instant to instant? Formulae for deriving the velocity and acceleration curves were mathematically determined for application to the smoothed angular displacement curve data.

The smoothed angular displacement curve data are fed into an "IBM 650" computer, programed with the velocity and acceleration formulae. A card is punched by the machine for each point, with its corresponding velocity and acceleration values. There is a packet of approximately 150 punched IBM cards for each joint. An experimental four-joint run of approximately 600 IBM cards has been put through a Librascope Data Plotter which automatically plots on paper the smoothed angular displacement curve data, together with its derivatives of velocity and acceleration (Fig. 4). For each cycle of opening and closing, there will be four angular displacement curves and the corresponding EMG's. In addition, there will be the velocity and acceleration for each of the four angular displacement curves.

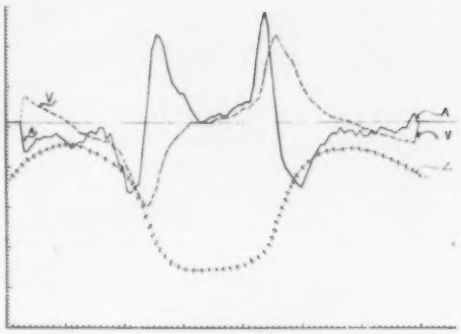

Figure 4. Velocity (V) and acceleration (A) curves have been derived and plotted from the angular displacement curve (∠) which is the same distal phalanx curve as shown at the top of figure 3.

Since opening and closing were done at no required rate of speed, the cycles vary in length. To compensate for this variation, a technic of slide projection is under development whereby the displacement curves are projected into a predetermined length and traced on separate sheets of thin paper. They may then be superimposed for comparison. The same method will permit comparison of two EMG's. For example, the tops of the wave envelopes of all the "integrated" EMG tracings for flexor carpi ulnaris can be traced, viewed, and compared.

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Case Reports

Bilateral Fractures of the Os Calcis

Martha Wroe, M.A.

The patient to be discussed is a 35 year old male iron worker who had sustained an injury to both heels on July 25, 1958, when he fell approximately 20 feet to the hard ground and landed flat-footed with resulting immediate pain and severe disability. X rays disclosed, bilaterally, severely comminuted fractures of the os calcis with partial loss of the salient angle.

On July 26, 1958, an open reduction of the comminuted fracture of the right os calcis was performed and maintenance of the reduction was assisted with grafts from the right ilium. On July 30, 1958, a similar procedure was performed on the left os calcis with maintenance of reduction with grafts from the left ilium. Boot casts had been applied following each operation.

On Aug. 7, 1958, the cast and sutures were removed from the right leg. The normal salient angle of 40 degrees had not been obtained, but X rays showed restoration of the angle to 20 degrees. The left leg cast was removed on Aug. 13, 1958; an angle of approximately 22 degrees had been achieved. Bilateral boot casts were applied again.

Nine weeks later the casts were removed, and recheck X rays appeared satisfactory to the orthopedic surgeon. Daily physical therapy was prescribed to consist of whirlpool, massage, exercises to both feet, and instruction in gait.

When the patient arrived for his initial treatment in physical therapy, he was utilizing a stationary walker and ambulating painfully with a very poor, flat-footed gait. The hamstrings and heel cords were "tight" bilaterally, and there was marked swelling, weakness, and limitation of motion about both feet and ankles. Goniometric measurements showed zero degrees of inversion and eversion bilaterally with 5 degrees of dorsiflexion on the right and 10 degrees on the left; plantar flexion was 15 degrees bilaterally.

Some time was spent during the first few treatments instructing the patient so as to achieve as good a walking pattern as possible. On the third day of treatment, the patient started walking with two canes, and after three weeks of treatment, he progressed to the use of one cane. An attempt was made to stress a good gait with support rather than immediately to discard all walking aids.

Active exercises to all ankle and toe motions were started in the lying and standing positions. According to the tolerance of the patient, the exercises progressed to a graduated resistive program using a pulley arrangement with the patient in the sitting position. Standing exercises and gait practice to include some stair climbing were continued.

This patient appeared to have a high tolerance for pain. He complained of pain only when walking or performing partial or full weight-bearing exercise. This pain was described as "deep" and "aching" in the region of the tarsal joints. He occasionally described some burning, sharp pains in the heel and around the lateral malleoli, especially on the right foot. There was no pain to touch or on the cutaneous surfaces of the feet. Pain and stiffness were most noticeable just after getting out of bed in the morning. He commented that after walking a short distance the stiffness was relieved. It was almost impossible for the patient to walk barefooted.

After the first three or four treatments, the patient felt that the pain was increased, but later during the treatment periods, he said that the whirlpool, massage, and exercises made his feet "feel better" and that temporarily at least the pain was lessened.

No medication for the relief of pain was prescribed or apparently needed by the patient during the time physical therapy was given.

The patient continued treatment on a daily basis for five weeks followed by treatment three times

Chief Physical Therapist and Instructor, University of Florida, Gainesville.

per week for two more weeks. At this time physical therapy for the patient was discontinued by the physician with instructions to continue exercises and walking; a suggested return date of eight weeks was recommended for a recheck with the physician. X ray reports at this date showed further evidence of normal healing although the fracture lines were not yet obliterated.

At the completion of the physical therapy treatment period, the patient walked short distances with no support with a fairly good gait. However, there was still pain present on weight bearing, particularly in the right foot. The swelling was reduced, and the strength was increased in all motions of the feet. There was still restriction of motion, but the range was improved on the left foot to 15 degrees of dorsiflexion, 35 degrees of plantar flexion, 10 degrees of eversion, and 5 degrees of inversion. On the right foot motion measured was 15 degrees of dorsiflexion, 25 degrees of plantar flexion, and 5 degrees in inversion and eversion.

The patient was extremely cooperative and regular in attendance throughout the treatment period. He had a good work record and a family of six to support, so he was motivated strongly to do anything that would assist him to return to some form of employment as soon as possible.

This patient also appeared to realize that some measure of permanent disability probably will persist. He has returned to his construction job in a limited capacity and seems anxious to make plans for a different type of permanent employment in construction even though this may involve a lesser pay scale.

Suggestions from the Field

Brace-Locking Attachment for Crutch or Cane

Garland A. Picou, B.S.

The inability of a patient to lock his own braces in the presence of severe flexor spasms in the lower extremities, or of weakness in the upper extremities, has long been a problem at Texas Rehabilitation Center. The importance of this problem is evident in that many patients who are otherwise independent in gait must depend upon someone else to perform this activity for them, thus limiting their functional independence.

When considering a mechanical assistive device to aid in locking a brace it is necessary that the following characteristics be present:

1. Simply operated so that it is suitable for the young child or brain damaged person as well as the adult.
2. Easily transported so that the person can have the device with him at all times; and, if possible, it should not be necessary to carry an extra piece of equipment.
3. Inexpensively constructed.

The *Brace-Locking Lever*,[1] gave us a device which is simply operated but its use made it necessary for the patient to carry extra equipment. Using the principle of the "locking bar," the individual parts of our brace-locking attachment were made by the Chief Orthetist[2] to fit our particular needs. With minor variations they may be fitted on other types of crutches or canes.

Individual parts include a load hook and a fulcrum selected according to the patient's needs.

A. The load hook:
   1. Double hook (Fig. 1) is necessary when locking bilateral long leg braces. Twisting effect can be controlled by making the hooks close fitting.
   2. A single hook (Fig. 2) is used when it is necessary to lock only one brace. The size of the hook will vary with the ability of the patient.

B. Fulcrum: Proper construction and fit of this part is crucial to good operation of the device. It must extend a sufficient distance (Fig. 2) from the crutch to allow adequate range to lock the brace before the lever arm strikes the body. The position on the crutch or cane to which it is attached will depend on the length of the patient's leg from knee to ankle.

Operation

The load hook is engaged at or about the ankle joint and the fulcrum slightly below the knee joint (exact placement will depend on the patient; with a few patients it operates best when placed above the knee joint). The lever arm or upper part of the crutch or cane is then pulled down toward the body. When all but the last

[1] Physical Therapist, Texas Rehabilitation Center of Gonzales Warm Springs Foundation, Gonzales, Texas.

Figure 1.
A. Double load hook
B. Fulcrum

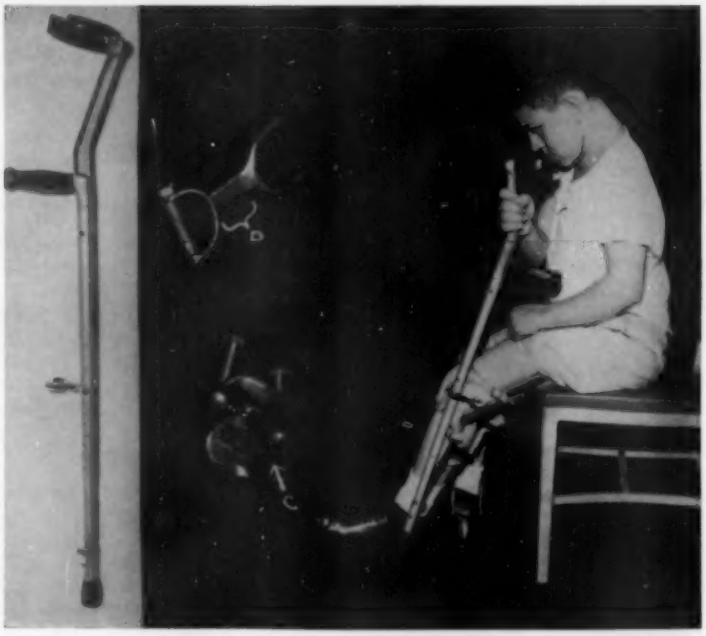

Figure 2.
C. Single load hook
D. Distance from fulcrum to crutch

few degrees of extension have been gained, a quick pull locks the brace.

This procedure in reverse will aid in unlocking the brace.

Other considerations

For the adult male wearing long trousers a large buttonhole-type slit in the lateral seam of the trousers allows engagement of the fulcrum without wearing a hole in the cloth. This slit is held closed by a small snap when not in use.

It is realized that the protrusion of these parts may present a safety hazard, in that a patient might fall on one of the parts. This problem has not been encountered in patients with whom we have worked.

In using bilateral crutches the weight of attachments (approximately 6 to 8 ounces) may pose an imbalance factor; however, adaptation to this was quickly accomplished by our patients. Thus far, it has not been necessary to weight the other crutch.

SUMMARY

Many patients with upper extremity weakness or flexor spasm in lower extremities have difficulty locking long leg braces.

Brace-locking attachments for crutches or canes have been devised to permit patients further independence and to meet the requirements of simple operation, easy transportation and low cost of construction.

The author wishes to acknowledge the assistance and support of Carmella Gonnella, Chief Physical Therapist, and Morjorie Kirkpatrick, M.D., Acting Medical Director, Texas Rehabilitation Center, Gonzales, Texas.

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Information for Contributors

The Physical Therapy Review welcomes original articles of interest to physical therapists throughout the world. Prompt reviewing and processing of papers will be assured if attention is given to the following suggestions.

Manuscripts are accepted with the understanding that they have not been published elsewhere. Contributions may be classified as "Feature Articles," "Suggestions from the Field," or "Case Reports." Feature articles are longer and deal rather extensively with the subject presented; suggestions from the field are brief and describe the instrument or device presented; case reports are short and concerned with discussion of a treatment for a specific type of disease or disability. All material should be presented in a clear, logical, and impersonal discourse.

Submit the original *manuscript* and one carbon copy (keep one carbon copy for your files). All written material should be typed, double-spaced with minimum margins of 1 inch on 8½ x 11 inch opaque white paper. Legends for illustrations, tables, references, and acknowledgments should be placed each on a separate sheet. When citing another author's work, a superscript numeral must appear in the body of the manuscript. The *references* must be accurate and numbered in the order in which they appear in the text. Include the name of each author, title of the article, name of periodical, volume number, inclusive pages, and date.

Illustrations should be protected by cardboard and the name of author and figure number written with soft pencil on the back. If *photographs* are used, sharp black and white prints on glossy paper are required, avoid distracting backgrounds. Graphs, charts, and line figures drawn with india ink on heavy white paper are necessary for good reproductions. Letters and figures should be large enough so that they will be readable when reduced for publication. Tables are reproduced more legibly when the carbon is reversed and typing occurs on both sides of the paper.

Address manuscripts to:

PHYSICAL THERAPY REVIEW
1790 Broadway—Room 310
New York 19, New York

The *Review* invites case reports from physical therapists who have followed an interesting course of treatment with or an unusual response to treatment by patients having one of the conditions listed below.

Industrial accidents
Aircraft injuries
Paralytic dislocation of the hip
Severe burns—a child
Bronchial asthma in geriatric patients
Pott's fracture
Psoriasis
Frozen shoulder syndrome

(*continued on page* 497)

Editorial

Take a look . . .

Sputtering carbon arc lamps, crackling static machines, long wave diathermy machines, pavaex boots, Morton-Smart, and Bristow coil —these and the splash and splatter of the Scotch douche in the "hydro" room were the once familiar sights and sounds of an earlier era when physical therapy clinics staggered under the strain of a wondrous and bewildering array of mechanical appliances. There they stood as though transfixed, waiting for the moment when they could bestow on the unwitting patient their heralded beneficent powers. Not far from this assemblage was the "gym" and sure enough there were the pulley weights, the rowing machine, the wrist roller, the stall bars, the parallel bars—all inherited from a regular "gym" and identical with the equipment normally used by healthy and able-bodied persons.

This physical therapy armamentarium served a purpose for several years. But, as always, where there is growth there must be change and the old gives way to the new. So, during the course of professional growth, certain forward-looking and enterprising individuals devised more adaptable, more efficient and safer equipment. The next generation, by virtue of an enlightened future and the benefits of retrospection, may regard these "streamlined" developments with amused incredulity, but to us they represent a vast improvement over the paraphernalia of the past. Today, the various devices, machines, and equipment of interest to the physical therapist constitute quite a formidable list and include rehabilitation supplies and self-help devices which have become more and more in demand with the increased stress on independent living for the disabled.

Faced with this expanding list of equipment, the physical therapist finds he must assume yet another responsibility—the responsibility of keeping informed of the relative value of each item, particularly as it pertains to his own situation. He is frequently involved in determining the selection of supplies and equipment used in physical therapy. To be well qualified in this area takes time and effort and pertinent information is not always readily available. There is no publication of tested products which may be consulted; there is no convenient store around the corner where one may browse at leisure

before reaching a decision; there are no unlimited funds which allow for the expensive method of trial and error. What, then, is the answer?

It seems to us that the APTA Annual Conference presents the best possible setting wherein you, the physical therapist, can become acquainted with the value, the uses, and desirability of merchandise on the market today. In the first place, you may consult any number of several hundred colleagues attending the conference. In all probability, some of them will have had experience with the type of product in which you are interested and may provide you with valuable information. In the second place, the exhibitors' booths are a welcome and expected feature of every conference. Representatives from the various companies are eager to know your needs, provide information, answer questions, and, of course, to hear your impressions of their products. You can inspect the items, see them work, have them demonstrated, try them yourself, compare, and evaluate.

Here is a real opportunity. Don't pass it by in your mad rush to get that free Coca-cola! And don't procrastinate only to arrive at the scene on the day of dismantling! Take a good look early in the week—your increased knowledge will benefit you, your employer, and, as always, the patients entrusted to your care.

Barbara Friz
Chairman, Editorial Board

International Society for the Welfare of Cripples: Eighth World Congress

The National Society for Crippled Children and Adults will serve as host during the Eighth Congress of the ISWC to be held at the Waldorf-Astoria in New York City, Aug. 20-Sept. 2, 1960. More than 30 national organizations and at least five others worldwide in scope will be participants. Speakers from almost 50 nations will appear on the program emphasizing help to the crippled as a means of fostering international cooperation between persons and groups in other areas.

English, French, German, and Spanish are the languages in which speakers of six general sessions will be heard. There will also be 15 major section meetings and a series of informal discussion groups. Program topics will be centered on crippling conditions and diseases with special attention given to community problems and relationships, social work, use of volunteers, special education, and psychological aspects of physical disability and personnel training.

The American Physical Therapy Association will present an exhibit portraying the "coverage" of the world by the *Physical Therapy Review*. Members of the Association who attend will join physical therapists and occupational therapists from member organizations of the World Confederation for Physical Therapy and the World Federation of Occupational Therapists for an afternoon session and a social hour.

The World Confederation for Physical Therapy will be ably represented by Rudie Agersnap, President, and Joyce Neilson, Honorable Secretary-Treasurer. The WCPT exhibit will reflect international relationships among physical therapists and physical therapists' participation in overseas assignments.

Mildred Elson, former Executive Director of the APTA and first President of WCPT, is serving on the Program Committee of the Eighth Congress.

Index to Current Literature

(*continued from page* 434)

RESPIRATION

Computer Watch and Clock Method for Taking Pulse and Respiration Rates. D. W. Bovet, G. P., 21: 102-103, February 1960

Notes on Mechanism of Rhythmic Respiration. G. C. Salmoiraghi and B. D. Burns, J. Neurophysiol., 23: 14-25, January 1960

The Diaphragm in Dystrophia Myotonica. J. E. Caughey and N. Pachomov, J. Neur. Lond., 22: 311-313, November 1959

MISCELLANEOUS

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The Physical Educator's Role in Physical Fitness. H. Harrison Clarke, Northwest M., 59: 56-60, January 1960

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1960 · CONFERENCE

Business Meetings and Program Schedule

June 23, 24, and 25 — **Board of Directors Meetings**

Sunday, June 26

9:00 A.M. — 5:00 P.M. — Section on Education
Self Employed Section
Public Health Section

5:00 P.M. — 10:00 P.M. — Pa Pitt's Melting Pot—Pennsylvania Chapter, Host
Pa Pitt Picnic and Square Dancing

Monday, June 27

9:00 A.M. — 5:00 P.M. — **General Registration**

9:00 A.M. — 12:00 Noon — **Delegates' Registration**

9:30 A.M. — 12:00 Noon — Group Meetings—Arthritis and Rheumatism Foundation, Crippled Children's Societies, Chapter Legislative Committees, Research Group, State Examining Committees

2:00 P.M. — 5:00 P.M. — Opening Session—Greetings, President's Address

THE ROLE OF THE EMPLOYER IN THE HEALTH OF THE WORKER, Dudley A. Irwin, M.D., Medical Director, Aluminum Company of America, Pittsburgh; and Miles O. Colwell, M.D., Plant Physician, New Kensington Branch, Aluminum Company of America

A LABOR HEALTH PROGRAM: ITS DEVELOPMENT AND SERVICES, Lorin E. Kerr, M.D., Assistant to the Executive Medical Officer, United Mine Workers of America Welfare and Retirement Fund, Washington, D. C.

Tuesday, June 28

9:00 A.M. — 12:00 Noon — THE NEED FOR REHABILITATION IN INDUSTRY, W. Scott Allan, Assistant Vice President, Liberty Mutual Insurance Company, Boston

MAINTAINING THE EFFICIENCY OF THE WORKER IN INDUSTRY, Jessie Wright, M.D., Associate Professor, Department of Physical Medicine and Rehabilitation, University of Pittsburgh

2:00 P.M. — 5:00 P.M. — **House of Delegates**

7:00 P.M. — 10:00 P.M. — **Film Theater**

Wednesday, June 29

9:00 A.M. — 12:00 Noon — HUMAN FACTORS ENGINEERING: WHAT IS IT?, Harwood S. Belding, Ph.D., Professor of Environmental Physiology, Graduate School of Public Health, University of Pittsburgh

Wednesday, June 29

9:00 A.M. — 12:00 Noon

THE ROLE OF THE PHYSICAL THERAPIST IN HUMAN FACTORS ENGINEERING, Pauline Potts, Capt., USAF Physical Therapist, USAF Hospital, USAF Aerospace Medical Center (ATC), Lackland AFB, Texas

THE ENERGY COSTS OF WORK, Amasa B. Ford, M.D., Director of the Rehabilitation and Teaching Program, and Senior Instructor in Medicine, Western Reserve University, Cleveland

2:00 P.M. — 5:00 P.M. **House of Delegates**

6:00 P.M. — 7:00 P.M. Reception for Board of Directors

7:30 P.M. **Annual Banquet**

Thursday, June 30

9:00 A.M. — 12:00 Noon *Concurrent Sessions*

ASSESSMENT OF FUNCTION—Physical therapists will discuss various testing methods. Physicians will observe and report at a general session

Session A

MANUAL MUSCLE TESTS, Jean Bailey, Chief Physical Therapist, Milwaukee County General Hospital, Milwaukee

GROSS MUSCLE TESTS, Margaret Camp, Chief Physical Therapist, Waterbury Hospital, Waterbury, Conn.

ACTIVITY TESTS, Maxine Schuldt, Supervisor of Physical Therapy, Curative Workshop of Milwaukee, Inc.

Physician Observers: Frederick W. R. Koenig, M.D., Chief of Orthopedics, South Side Hospital and St. Joseph's Hospital, Pittsburgh; Paul Kost, M.D., Director of Physical Medicine and Rehabilitation, Veterans Administration Hospital, Pittsburgh

Session B

MOBILITY TESTS, Hildegarde Myers, Chief Physical Therapist, Rehabilitation Institute of Chicago

ELECTRICAL TESTS, Edna Dillon, Major, AMSC, Chief, Physical Therapy Section, Fitzsimons General Hospital, Denver

CIRCULATORY AND RESPIRATORY TESTS, Dorothy Briggs, Fellow of The National Foundation, Department of Physiology, University of Wisconsin

Physician Observers: Harry Fisher, M.D., Orthopedic Surgeon, Presbyterian Hospital, Montefiore Hospital, and St. Francis Hospital, Pittsburgh, and D. T. Watson Home for Crippled Children, Leetsdale; Robert J. Halen, M.D., Works Physician, Pittsburgh Works, Jones and Laughlin Steel Corporation, Pittsburgh

11:00 A.M. — 12:00 Noon *General Session*

THE ROLE OF THE PHYSICAL THERAPIST IN THE EVALUATION OF PHYSICAL IMPAIRMENT, Physician Observers: Dr. Koenig, Dr. Kost, Dr. Fisher, and Dr. Halen

2:30 P.M. — 5:00 P.M. *Concurrent Sessions*—Original Papers

Session A

SELECTIVE STRETCHING FOR THE PARALYTIC PATIENT, Hazel V. Adkins, Viola Robins, Frances Eckland, Jacquelin Perry, M.D., and Vernon L. Nickel, M.D.; The Respiratory and Rehabilitation Center for Poliomyelitis, Rancho Los Amigos Hospital, Downey; and The Department of Orthopedic Surgery, College of Medical Evangelists, Los Angeles

MUSCLE TESTING: RELIABILITY IN CLINICAL USE, Dorothy M. Iddings, Laura K. Smith, and Paul R. Harrington, M.D.; Texas Institute for Rehabilitation and Research, Houston

PATELLAR TENDON BEARING-CUFF SUSPENSION BELOW-KNEE PROSTHESIS, Bernard R. Strohm and Lorraine Ogg; Department of Physical Therapy, University of California Medical Center, Los Angeles

2:30 P.M. — 5:00 P.M. *Concurrent Sessions*—Original Papers

Session B

HOME EVALUATION PROCEDURES, Beth Fowles, Helen Stewart, and Susan P. Mahan; Department of Physical Therapy, Highland View, Cuyahoga County Hospital, Cleveland

RAPID REHABILITATION OF THE INJURED BACK IN AN INDUSTRIAL ENVIRONMENT, Daniel R. Bartholomew and Walter G. Vernon, M.D.; Lukens Steel Company, Coatesville, Pennsylvania

PHYSICAL THERAPY IN THE TREATMENT OF DECOMPRESSION SICKNESS WITH SPINAL CORD INVOLVEMENT, Lieutenant Joyce McDowell, AMSC; and Major Amelia D. Amizich, AMSC; Physical Therapy Clinic, Tripler U. S. Army Hospital, Honolulu

7:30 P.M. — 10:30 P.M. Chapter Workshop
Theme: Leadership

Friday, July 1

9:00 A.M. — 10:30 A.M. *Concurrent Sessions*

PHYSICAL THERAPY IN TRAUMA AND DISEASE

Session A

SPRAINS, STRAINS AND CONTUSIONS, Barbara Peterson, Director, Department of Physical Therapy, Henry Ford Hospital, Detroit

BURNS, James Roodhouse, Chief Physical Therapist, Institute of Physical Medicine and Rehabilitation, Peoria, Ill.

ARTHRITIC CONDITIONS, Raymond Rabideau, Technical Director, Iron Range Rehabilitation Center, Virginia, Minn.

Session B

SOFT TISSUE SYNDROMES, Margaret Wells, Head of Physical Therapy, Allen-Bradley Company, Milwaukee

HAND INJURIES, Wesley Fegely, Physical Therapist, Campbell Soup Company, Camden, N. J.

PERIPHERAL NERVE LESIONS, Robert Hickock, Coordinator, Division of Rehabilitation, The Jewish Hospital, St. Louis

Session C

LOW BACK DISABILITIES, Nicholas Lorusso, Physical Therapist, Ochsner Foundation Hospital, New Orleans

SPINAL CORD INJURIES, Marguerite C. Rukse, Chief of Physical Therapy, Man Memorial Hospital, Man, West Virginia

FRACTURES AND DISLOCATIONS, Katherine Leary, Supervisor of Physical Therapy, The Rehabilitation Center, Boston

11:00 A.M. — 12:00 Noon *General Session*

THE ROLE OF THE PHYSICAL THERAPIST IN THE INDUSTRIAL PICTURE, Adolph G. Kammer, M.D., Professor, Head of Department of Occupational Health, Graduate School of Public Health, University of Pittsburgh

2:00 P.M. — 5:00 P.M. Program—Tours to Columbia Hospital, Home for Crippled Children, St. Francis General Hospital, South Side Medical Building, and University of Pittsburgh Medical Center in Pittsburgh; Harmarville Rehabilitation Center in Harmarville; and the D. T. Watson Home for Crippled Children and the School of Physiatrics in Leetsdale

Section on Education

Chairman
MARGARET BRYCE

Vice Chairman
ELEANOR M. FLANAGAN

Secretary
ANNA J. JANETT

Treasurer
MILDRED HEAP

Sunday, June 26

8:00 A.M. — 5:00 P.M.

8:00 A.M. Membership dues received

9:00 A.M. Introduction
Report of the Exploratory Session on Graduate Education—Mildred Wood
The Role of Graduate Education in the Growth of Physical Therapy as a Profession—Dean Wesley G. Hutchinson, School of Allied Medical Professions, University of Pennsylvania
How Undergraduate Methods and Attitudes in Teaching Can Set the Climate for Graduate Study—Dr. Howard G. Miller, Head, Department of Psychology, North Carolina State College
Discussion

12:30 P.M. Luncheon and business meeting

2:00 P.M. Graduate Education for Physical Therapists—Reflections on Three Areas of Interest
Graduate Study in Physical Therapy—Norma Jean Ewan
Graduate Study in the Basic Sciences (Anatomy and Physiology)—James Griffin, Ph.D.
Graduate Study in Psychology—Margot Trimble
Discussion—all speakers, with questions from the floor

Self Employed Section

Chairman
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Recording Secretary
JEANNE S. GEREN

Sunday, June 26
8:45 A.M. — 5:00 P.M.

8:45 A.M. Registration

9:30 A.M. Call To Order—Welcome
Development of a Physical Therapy Facility
Three members will present original papers.

1:30 P.M. A Physical Therapy Department at the Core of the Medical Community—Film
Business Meeting

Public Health Section

Chairman
HELEN H. VAUGHN

Secretary
ANNA L. SWEELEY

Vice Chairman
MARIAN H. PRATT

Treasurer
LOIS M. MITCHELL

Sunday, June 26
9:00 A.M. — 5:00 P.M.

9:00 A.M. Registration

9:30 A.M. — 12:00 Noon Opening Address: Jack Sabloff, M.D., Division of Maternal and Child Health, Pennsylvania State Department of Health, Harrisburg
Clinical Affiliations of Student Physical Therapists in Public Health Programs
Margaret L. Moore, Director of Curriculum in Physical Therapy, University of North Carolina, Chapel Hill
Anne Parrish, Physical Therapy Consultant, North Carolina State Board of Health, Raleigh

2:00 P.M. Panel Discussion: Physical Therapy in Schools for the Handicapped
Gertrude Bartlett, Frederick J. Gaenslen School, Milwaukee
Rebecca Hastings, Baer School, Baltimore
Vera Keating, Widener Memorial School, Philadelphia
Allan Quail, Crippled Children's Hospital and School, Sioux Falls

3:30 P.M. Business Meeting

Alumni Meetings at Conference

Members, graduates of all schools of physical therapy, will find an opportunity to renew their friendships with classmates and faculty during Annual Conference. Each year there are spontaneous gatherings among alumni arranged on the spot and announced in the Conference daily newspaper. Special functions arranged for by the faculty or alumni of several schools have been announced.

On Monday, June 27, University of Connecticut alumni will reunite from 6:00 P.M. to 9:00 P.M., Ohio State University alumni and University of Southern California graduates will enjoy "Mixers" from 5:00 P.M. to 7:00 P.M. On Wednesday, June 29, there will be luncheon meetings of alumni of Duke University, the University of Iowa, and the University of Wisconsin. Graduates of the Washington University and Barnes Hospital School of Physical Therapy will gather following the Annual Banquet on Wednesday evening. Columbia University graduates will have an alumni luncheon on Thursday, June 30 at 12:00 noon.

The D. T. Watson Alumni will meet for dinner at the School on Tuesday, June 28, at 7:00 p.m. Alumni who have not received homecoming announcements should notify the School.

Conference speakers

Harwood S. Belding, Ph.D., is Professor of Environmental Physiology, Graduate School of Public Health, University of Pittsburgh. Dr. Belding is a graduate of Wesleyan University in Connecticut and has received a master of arts degree from the University of Connecticut and a doctor of philosophy degree from Stanford University. From 1933 to 1945 he held appointments at the University of Connecticut from Assistant Instructor to Associate Professor of Zoology (Physiology). Dr. Belding was, during 1946 to 1950, affiliated with the Quartermaster Climatic Research Laboratory at Lawrence, Massachussetts. In 1951 he received his appointment to the University of Pittsburgh. Dr. Belding has, during parts of his tenure in these positions also served as: Assistant Professor in Medical Physiology, Stanford University; Assistant Professor of Industrial Physiology, Howard Fatigue Laboratory; Consultant of the Office of the Quartermaster General and to the Air Material Command. Dr. Belding is the editor of *Ergonomics Journal*. He is a member of: the Committee on Physiological Research, American Society of Heating and Air Conditioning Engineers; Committee on Aging, National Social Welfare Assembly; Advisory Panel on Medical Science, Office of Secretary of Defense; Advisory Committee on Environmental Medicine, Office of the Surgeon General of the Army; Subcommittee on Shelter and Clothing, National Research Council; Committee on Human Factors in Engineering, American Society of Mechanical Engineers; Committee on Environmental Protection, Advisory Board on Quartermaster Problems, National Research Council; and Steering Committee for International Organization of Human Work Scientists. In 1956 the European Productivity Agency and the International Cooperation Administration invited The Graduate School of Public Health to supply an advisor for their jointly sponsored project, "Fitting the Job to the Worker." Dr. Belding accepted the task of selecting a multidisciplinary team of European specialists, organizing a two month course in the United States, and assisting in the conduct of an international technical conference in Leiden. Dr. Belding was also the U. S. advisor to the Conference for Labor and Management on Human Factors Engineering in Zurich, Switzerland. Dr. Belding is highly qualified to speak at the Wednesday morning Conference session, on "Human Factors Engineering—What Is It?"

Harry Fisher, M.D., orthopedic surgeon, serves on the staff of Presbyterian, Montefiore, and St. Francis Hospitals, Pittsburgh, and D. T. Watson Home for Crippled Children in Leetsdale. Dr. Fisher in 1930 received his bachelor of science degree from Duquesne University and his doctorate in medicine from St. Louis University in 1934. In World War II, he served as a Major in the Medical Corps. Dr. Fisher is the author of articles published in the *Journal of Bone and Joint Surgery, Journal of Chest Physicians*, and *Orthopedics*. He is a Diplomate of the American Board of Orthopedic Surgery, and holds membership in the American Academy of Orthopedic Surgery, the American College of Surgeons, and the International College of Surgeons. Dr. Fisher will observe the "Assessment of Function," Session B, and with Dr. Halen, will report his observations following the Thursday morning concurrent session.

Robert J. Halen, M.D., Works Physician, Pittsburgh Works of the Jones and Laughlin Steel Corporation, holds a concurrent appointment as Clinical Instructor, Graduate School of Public Health, University of Pittsburgh. Dr. Halen, a 1946 graduate of the University of Pittsburgh, completed his medical education at the same university's School of Medicine in 1948. After completing his military service, he returned to the University of Pittsburgh and received a master's degree in public health from the Graduate School of Public Health. Formerly, he held the post of physician with the Jones and Laughlin Steel Corporation and Monongahela Connecting Railroad, and was also associated with the University of Pittsburgh Occupational Health Clinic and Cardiac Work Evaluation Clinic. Dr. Halen,

in 1958, was certified by the American Board of Preventive Medicine. A member of Alpha Omega Alpha, Dr. Halen also holds membership in the American Medical Association, Industrial Medical Association, Industrial Medical Association of Pittsburgh, and Allegheny County Medical Society. He is the author of two articles related to industrial medicine published in 1959. Dr. Halen will observe the Thursday morning Session B on the "Assessment of Function," and with Dr. Fisher will comment on physical therapy in industrial medical practice.

Paul F. Kost, M.D., is Chief of the Physical Medicine and Rehabilitation Service at the Veterans Administration's Neuro-Psychiatric Hospital in Pittsburgh, serves as Medical Director of the U. S. Army Reserve School in Pittsburgh, and is an instructor in microbiology at the University of Pittsburgh. A graduate of Pennsylvania State University, Dr. Kost earned doctor of philosophy and medical degrees at the University of Pittsburgh in 1941 and 1952 respectively. Dr. Kost, from 1942-1946, served with the U. S. Army Air Corps as a pathologist. On Friday of Conference week, Dr. Kost will participate as a physician observer along with Dr. Frederick Koenig during Session A, "Assessment of Function."

F. W. R. Koenig, M.D., Chief of Orthopedics, South Side Hospital and St. Joseph's Hospital, Pittsburgh, holds concurrent appointments as Consultant in Orthopedics at St. Clair Memorial Hospital, and Consultant in Orthopedics and Chief of Pilot Prosthetics Clinic, Veterans Administration, Pittsburgh. A graduate of Washington Jefferson College in 1935, Dr. Koenig continued his education and in 1939 was granted his doctorate in medicine at the University of Pittsburgh. He was later awarded a fellowship for postgraduate study in orthopedics at Northwestern University. Dr. Koenig served as a Major in the U. S. Army during World War II. He is a Diplomate of the American Board of Orthopedic Surgery and a Fellow, American College of Surgeons. Dr. Koenig is a member of the American Academy of Orthopedic Surgery, Interstate and Pennsylvania Orthopedic Societies, Pittsburgh Academy of Medicine, and Allegheny County Medical Society. Dr. Koenig will participate during Thursday morning on "Assessment of Function," Session A, as an observer and commentator.

Jessie Wright, M.D., Associate Professor of Physical Medicine and Rehabilitation, the University of Pittsburgh School of Medicine, holds concurrent appointments as Medical Director, the D. T. Watson School of Physiatrics, affiliated with the University of Pittsburgh; Chief of Staff, the D. T. Watson Hospital-School; Consultant in Physical Medicine and Rehabilitation, University of Pittsburgh Medical Center Hospitals; and Chairman, Committee on Rehabilitation, Goodwill Industries of Pittsburgh. Dr. Wright studied physical therapy from 1920 to 1922 and completed the special physical therapy course at Harvard Medical School in 1922. She received her baccalaureate degree and medical degree at the University of Pittsburgh in 1932 and 1934 respectively. Dr. Wright is a member of: the American Academy of Physical Medicine and Rehabilitation, American Medical Association, American Academy for Cerebral Palsy, American Rheumatism Association, American Medical Writers' Association, International Society for the Welfare of Cripples, Advisory Committee of The National Foundation, World Medical Association, and the American Physical Therapy Association having become a member in 1923 and

an Associate member in 1935. She has been honored as: Woman of the Year in Pittsburgh, 1950; Distinguished Daughter of Pennsylvania, 1952; and Who's Who in the East, 1957. She has written numerous articles, three of which have appeared in the *Physical Therapy Review* in 1945, 1946, and 1947. Dr. Wright will speak Tuesday morning during Conference on "Maintaining the Efficiency of the Worker in Industry."

Jean C. Bailey, Chief Physical Therapist, Milwaukee County General Hospital, Milwaukee, Wisconsin, also holds an appointment as Instructor, Physical Therapy Curriculum, Marquette University. Miss Bailey received a bachelor of science degree from Sargent College, Boston University, in 1933. She has held previous positions in Buffalo, New York; Rutland, Vermont; Wilmington, North Carolina; as well as with the U.S. Navy. In 1953-54 Miss Bailey was associated with the Gamma Globulin Field Service and Research program conducted by the Public Health Service, U.S. Department of Health, Education, and Welfare. Miss Bailey has attended a special course in Care of Respiratory Patients given at Houston, Texas. She is a member of the National Rehabilitation Association. Miss Bailey has published "Association Between Antibodies Against Poliomyelitis and Muscle Weakness" in *Pediatrics*, May, 1958. At the Thursday morning concurrent Session C, Miss Bailey will present "Manual Muscle Testing."

Wesley D. Fegely, Physical Therapist, Campbell Soup Company, Camden, New Jersey, is a graduate of Springfield College and received his physical therapy certificate from the University of Pennsylvania in 1954. Mr. Fegely held a physical therapy position at Shriners Hospital, Philadelphia, for two years before accepting his present position. He also served for two years in the U.S. Army. Mr. Fegely will present at the Friday morning concurrent Session B, "Hand Injuries in Industry."

James W. Roodhouse, Chief Physical Therapist and Coordinator of Physical Therapy Services, Institute of Physical Medicine and Rehabilitation, Peoria, Illinois, received his bachelor of science degree at Bradley University in 1954. After receiving his certificate in physical therapy from the University of Wisconsin in 1955, Mr. Roodhouse held a staff physical therapy position in Modesto, California. In 1956 he joined the staff of the Institute of Physical Medicine and Rehabilitation in Peoria and served as Area Supervisor, then Divisional Supervisor, Methodist Division, prior to his present position. Clinical prosthetics, above-knee amputations, concepts of management, and human relations in supervision are special courses in which Mr. Roodhouse has participated. Friday morning in concurrent Session A, Mr. Roodhouse will present "Physical Therapy for Patients Who Have Suffered Burns."

Margaret O. Camp, Chief Physical Therapist, Waterbury Hospital, Waterbury, Connecticut, received a baccalaureate degree from Connecticut College and a certificate in physical therapy from Simmons College. Miss Camp has held positions as staff physical therapist in Boston and Nashville and instructor in physical therapy at the Bouvé Boston School. She has attended special courses on technics of neuromuscular re-education, neurophysiology in the treatment of neuromuscular dysfunction, and prosthetics. Miss Camp was awarded a National Foundation travel-

ship in 1954. During the Thursday morning concurrent Session A, Miss Camp will present a paper on gross muscle testing.

Maxine F. Schuldt, Supervisor of Physical Therapy, Curative Workshop of Milwaukee, received her preparation to teach physical education at La Crosse Teachers College, La Crosse, Wisconsin. Three years after receiving her baccalaureate degree she entered the certificate program at the School of Physical Therapy, Northwestern University. After graduation, Miss Schuldt served four years with the United States Army, followed by positions in Richmond, California, and San Francisco where she served The May T. Morrison Center for Rehabilitation as Supervisor and as Program Director. She is a member of Delta Psi Kappa and Kappa Delta Pi, honorary societies, and the National Recreation Association. Highly experienced in physical therapy and rehabilitation for industrial accident patients, Miss Schuldt will discuss, on Thursday morning in Session A, "Activity Testing, Including Gait and Self-Care Activities."

Margaret C. Rukse, Chief Physical Therapist, Miners Memorial Hospital, Man, West Virginia, received a bachelor of arts degree from Marshall College, Charleston, West Virginia, previous to receiving a certificate in physical therapy from the Medical College of Virginia. Mrs. Rukse's experience in a general hospital and an orthopedic surgeon's office preceded her 1956 employment in the present position. Mrs. Rukse will discuss physical therapy for patients with spinal cord injury Friday morning in concurrent Session C.

Barbara Peterson is Director of the Department of Physical Therapy, Henry Ford Hospital, Detroit. She received a baccalaureate degree and certificate in physical therapy from Northwestern University. Miss Peterson has attended the New York University special course on lower extremity prosthetics. She has written an article, "Wax Bath Home Routine," which appeared in *Canadian Physiotherapy Journal.* Miss Peterson will present a paper on sprains, strains, and contusions on Friday morning, Session A.

Conference Exhibits

Scientific Exhibits

ARTHRITIS AND RHEUMATISM FOUNDATION
New York, New York

"Arthritis, Our Nation's Greatest Crippler" vividly illustrates the effect of the crippling disease on the American family. Treatment and research programs of the Arthritis and Rheumatism Foundation demonstrate the theme, "Care Today and a Cure Tomorrow." Educational literature available through the A.R.F. is shown.

THE CHILDREN'S REHABILITATION INSTITUTE, INC. FOR CEREBRAL PALSY
Reisterstown, Maryland

"Therapies at Children's Rehabilitation Institute." Selected photographs of Physical Therapy, Occupational Therapy, and Speech Programs. No attempt has been made to summarize an integration of services for total management of cerebral palsy. Descriptive material is presented for those familiar with basic technics and seeking additional ideas and concepts.

DUKE UNIVERSITY MEDICAL CENTER
Department of Physical Therapy
Durham, North Carolina

"Physical Therapy in the Total Care of the Patient: Coordinated Practice, Teaching, and Research" of the Department of Physical Therapy with the Division of Neurology as an example of the role of physical therapy in a teaching hospital. The various medical and surgical specialties in which similar programs are carried on are listed.

GEORGE WASHINGTON UNIVERSITY
Washington, D. C.

"Double-Blind Evaluation of a New Agent in Musculoskeletal Disorders." An investigation utilizing the double-blind technic to obtain an objective reaction to a new compound for the relief of muscle spasm and pain. Charts, graphs, and electromyographic tracings provide objective evaluation of the study.

HIGHLAND VIEW HOSPITAL
Cleveland, Ohio

"Able to Live Again—Aspects of Long Term Hospital Care" shows a coordinated treatment program geared to patients with long term illnesses. The program involves all hospital professional services with emphasis on rehabilitation, the goal of which is to return the patient to the community with maximum independence.

HOLY GHOST HOSPITAL, REHABILITATION UNIT
Cambridge, Massachusetts

"Muscle Rehabilitation by Steroid Therapy and Sling Suspension." A demonstration of the concepts of sling suspension as a type of exercise through the use of a link-type bedspring as suspension points. The apparatus is used for improving steroid-softened hip contractures by stretching, for hip and trunk extension, and hip abduction.

MUSCULAR DYSTROPHY ASSOCIATIONS OF AMERICA, INC.
New York, New York

"Progressive Muscular Dystrophy." Figure drawings show progressive wasting and weakness in various parts of the body. The manifestations of muscular dystrophy are presented by color slides. The common forms of dystrophy and their onset, course, and duration in persons of varying ages are stated and a differential diagnosis outlined.

THE NATIONAL FOUNDATION
New York, New York

"Why Should a Voluntary Health Agency Support Professional Education?" Critical shortages of professional persons for research, teaching, and patient care obligate a health agency promoting research and patient care to add to the pool from which all programs requiring such personnel must draw. The exhibit outlines The National Foundation's professional education program.

NATIONAL INSTITUTES OF HEALTH, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Bethesda, Maryland

"Use of Plaster Casts and Splints in the Care of Patients Having Rheumatoid Arthritis." Emphasis is placed on prevention of joint contractures and the correction of existing contractures with significant effects on the patient's functional ability. Based on experience with more than 100 patients and the applications of over 200 casts and splints.

NATIONAL SOCIETY FOR CRIPPLED CHILDREN AND ADULTS, INC.
Chicago, Illinois

"You and Your Future." An exhibit of the Personnel Employment Services of the National Society for Crippled Children and Adults as they relate to the physical therapist. This is a "working booth," presenting job opportunities and counseling to both employee and employer.

PUBLIC HEALTH SERVICE, DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Washington, D. C.

"I Must Down to the Seas Again" introduces the exhibit's functional theme, physical therapists' and occupational therapists' participation in the clinical care of merchant seamen and other Public Health Service beneficiaries. U.S. Public Health Service Hospitals and Outpatient Clinics admit male and female patients of all ages with a wide variety of diagnoses.

UNITED STATES AIR FORCE MEDICAL SERVICE
Washington, D. C.

"The 'Normal' Lumbrosacral Spine." A knowledge of the frequency of abnormalities, anomalies, and normal variations, allows us to place these findings in proper perspective, relative to the symptom of low back pain. Illustrative roentgenograms and tabulations from a study of 936 healthy young males with no history of back pain.

UNITED STATES ARMY MEDICAL SERVICE
Washington, D. C.

"Professional Writing." The purpose of the exhibit is to stimulate professional writing and point out the contributions made by Army Physical Therapists to professional journals. The exhibit will include suggested sources from which material for writing articles may be procured plus examples to be found in issues of professional journals.

UNITED STATES NAVY
MEDICAL SERVICE CORPS
Washington, D. C.

"Physical Therapy, U.S.N." This exhibit, in the form of a seascape diorama, graphically shows a huge painting framed by a large anchor and seal. Some highlights of physical therapy training in the Medical Department of the Navy are portrayed.

UNIVERSITY OF CALIFORNIA, LOS ANGELES
SCHOOL OF MEDICINE,
DEPARTMENT OF SURGERY
Los Angeles, California

"Below-Knee Prosthesis: Patellar-Tendon, Bearing, Cuff Suspension." The exhibit shows the various stages of socket fabrication, the total components in assembled positions and detached positions, and the difficult problem of alinement with an adjustable prosthesis.

UNITED CEREBRAL PALSY ASSOCIATIONS, INC.
New York, New York

"The Role of the Family Doctor in Cerebral Palsy." Diagnosis, treatment and rehabilitation of the cerebral palsied patient, including work with parents, school authorities, dentists, physical, occupational, and speech therapists. The aim of all professionals concerned is providing maximum opportunity for the patient's full participation in family, vocational, and community life.

VETERANS ADMINISTRATION
Washington, D. C.

"Clinical Prosthetics." Principles and technics for the prosthetic and orthotic rehabilitation of difficult cases are demonstrated. Prescription and check-out processes are highlighted. Teamwork concepts are emphasized.

Technical Exhibits

THE AMERICAN WHEEL CHAIR, DIVISION OF INSTITUTIONAL INDUSTRIES, INC.
Cincinnati, Ohio
Booth 24

American Wheel Chair Division will display wheel chairs, walkers, get-about chairs, and commodes. The AMERICAN line includes wheel chairs with removable arms, interchangeable footrests and legrests, reclining backs, headrests, arm slings, and new developments in rehabilitation equipment. Roland K. Higbee, Sales Manager and Marvin E. Graber will assist you.

THE JOHN BUNN CO.
Buffalo, New York
Booth 20

Showing the new Franklin Hospital Bed which can automatically place a patient in any position from Trendelenberg to vertical, including a true cardiac. Walk-off feature and tilt-table give extreme flexibility. Air Pulsating Pad for prevention and relief of bedsores is all-new at lower price—provides current interest point.

THE BURDICK CORPORATION
Milton, Wisconsin
Booths 21-22

The Burdick Corporation will display in booths 21 and 22 representative items of their line of Physical Therapy equipment. Of special interest will be the new MS-600 Muscle Stimulator, a compact and versatile generator of faradic type and unidirectional currents.

S. H. CAMP & COMPANY
Jackson, Michigan
Booth 12

Orthopedic Supports and Appliances for men, women, and children; pelvic, head, and leg traction apparatus; ankle, cervical, chair back, clavicle, Goldthwait, hyperextension, Knight spinal, lordosis and Taylor braces; arm sleeves and slings. See them and talk with our factory representatives.

CHATTANOOGA PHARMACAL CO., INC.
Chattanooga, Tennessee
Booth 42

HYDROCOLLATOR, Moist Heat Easily Applied. Welcome to the Hydrocollator booth. Those of you who are not already using the Hydrocollator, visit our booth for a complete demonstration. Feel for yourself the intense, effective Moist Heat of the Steam Pack, and see its complete convenience and simplicity of use.

THE COCA-COLA COMPANY
New York, New York

Ice-cold Coca-Cola served through the courtesy and cooperation of the Quaker State Coca-Cola Bottling Company, Pittsburgh, Pennsylvania, and the Coca-Cola Company.

THE COLSON CORPORATION
Chicago, Illinois
Booth 17

Colson will exhibit a representative line of their folding wheel chairs, from the new reclining back chair, featuring automatic adjusting telescopic legrest and anti-tipping device, juvenile wheel chair and child's growth chair, solid and hammock seat models.

COSMO, DIVISION OF COSMEVO SURGICAL & ORTHOPEDIC CORP.
Hackensack, New Jersey
Booth 62

An improved line of surgical and orthopedic appliances designed and custom manufactured by Cosmo Orthopedic Manufacturing Co., a division of Cosmevo Surgical and Orthopedic Corp. These advance-design braces and supports afford an opportunity for early training and rehabilitation for amputees, paraplegics, geriatrics, as well as accident and disease cases.

DAKON CORPORATION
New Hyde Park, New York
Booth 16

Manufacturers of dependable Hydrotherapy Equipment for 25 years. Makes Whirlpool Baths in 26 different models, both mobile and stationary, including Hubbard and Hubbard Wading Tanks. All are listed by Underwriters' Laboratories. Manufacturers of portable Whirlpool Bath for use in home bathtubs.

DALLONS LABORATORIES, INC.
Los Angeles, California
Booth 25

Dallons Laboratories, Inc. will exhibit the Futura lines of advanced design and advanced engineering apparatus for Physical Medicine. We invite your careful inspection and comparison of this attractive line. You will quickly see why doctors and physical therapists everywhere are acclaiming the Dallons Futura line as "the instruments of choice."

DYNAWAVE CORPORATION
Staunton, Virginia
Booth 54

DynaWave is designed to furnish Safe, High Intensity, Monopolar electric pulses, and to discharge them through areas under treatment by means of a movable (active), and a fixed (dispersive) electrode. It embodies properties that induce MAXIMUM SUBCUTANEOUS STIMULATION WITH MINIMUM SENSORY DISTURBANCE.

ELGIN EXERCISE APPLIANCE COMPANY
Elgin, Illinois
Booth 1

The originators and manufacturers of PROGRESSIVE RESISTANCE EXERCISE EQUIPMENT will INTRODUCE AN ENTIRELY NEW EXERCISE UNIT. The NEW ELGIN EXERCISE CHAIR is excellent for resistive, assistive, or reciprocal motion exercise and requires minimum space. The universally used COMPLETE ELGIN EXERCISE UNIT, MODEL A-1500, and all Elgin accessories will be shown.

EVEREST & JENNINGS, INC.
Los Angeles, California
Booth 63

See the Everest & Jennings Mono Drive Attachment. This new power attachment can easily be attached to most Everest & Jennings chairs, enhancing the patient's ability to move about freely. Get your free notebook and pencil at the Everest & Jennings booth. Harry S. Dunn and Mike Murray will be in attendance.

FASCOLE CORPORATION
New York, New York
Booth 64

Presenting the complete line of REHABILITATION EQUIPMENT and SELF-HELP DEVICES, featuring improved Exercise and Training Aids, plus outstanding items such as our HYDRO-LEVEL LOUNGE COT, new SHOWER SEATS, SAFETY HAND BRAKES FOR WALKERS and many more. Get your current FASCOLE Catalog for easy reference.

GENERAL MEDICAL EQUIPMENT CORP., DIVISION OF LUMEX, INC.
Valley Stream, New York
Booth 2

LUMEX "Quality Engineered" Patient Aids will be featured in the exhibit. Included will be the exclusive Push-Button Folding Walkers, commodes, the LUMEX folding formica utility tables and wheel chair tables. The new hand brakes for the Walker-Chair will be shown for the first time.

GREAT BOOKS OF THE WESTERN WORLD
New York, New York
Booth 57

The Great Ideas Program. A new advancement in liberal education, spanning 3,000 years of Western Thought featuring the master key to the GREAT BOOKS, The Syntopicon, a new reference work, accomplishing in the field of ideas what the dictionary does for words and the encyclopaedia in the field of facts.

W. R. HAUSMANN WOODWORK, INC.
New York, New York
Booth 11

W. R. Hausmann, Inc. will display their fine line of precision crafted physical therapy equipment. Many new patient aid devices available for your inspection. Mr. Hausmann and Mr. Kratt will be on hand to greet you and discuss any phases of this new equipment, so stop by and say hello.

ILLE ELECTRIC CORPORATION
Williamsport, Pennsylvania
Booth 41

PHYSICAL THERAPY EQUIPMENT. Ille Electric Corporation welcomes you to its booth to see the latest available units for the after-care treament of fractures, and for muscle improvement of many disabling conditions. On display will be the famous TWO MOTOR MOBILE WHIRLPOOL BATH, Paraffin Bath and Moistaire Heat Therapy Unit.

LABERNE MANUFACTURING CO., INC.
Columbia, South Carolina
Booth 15

The following LaBerne products are on display: The new Portable Ankle Exerciser; Extension-Flexion Exercise Unit, providing complete range of progressive resistive exercise to the knee muscle group without use of weights; Shoulder Rotator for internal and external rotation; Heel Stretcher; the LaBerne Pronator-Supinator; and the LaBerne Hip Rotator.

MEDCO PRODUCTS CO., INC.
Tulsa, Oklahoma
Booth 66

Presenting the MEDCO-SONLATOR. Providing a new concept in therapy by combining muscle stimulation and ultrasound simultaneously through a SINGLE Three-Way Sound Applicator. The MEDCO-SONLATOR is a distinct advance in the effectiveness of physical therapy. A few minutes spent in our booth should prove of value to you.

MIDWEST IMPORTS,
PHYSICAL MEDICINE DIVISION
Hinsdale, Illinois
Booth 3

Midwest Imports exhibits the SIEMENS PHYSICAL THERAPY line, appreciated in 92 countries; a complete line of low volt generators, a thermal cabinet and a new infrared lamp. See the SIEMENS ULTRATHERM and ISOTHERM super-automatic diathermy machines with automatic tuner SERVOMAT.

MUTUAL OF OMAHA
Omaha, Nebraska
Booth 38

Underwriters of the Official Disability Insurance Program of the APTA since 1953. Stop by booth 38 for detailed information on this outstanding coverage, and learn how you, as an APTA member, can obtain this professional plan of protection at extremely low cost.

PORTO-LIFT MANUFACTURING COMPANY
Lansing, Michigan
Booth 7

PORTO-LIFT is designed for smooth and effortless patient lifting in a prone or seated position at the touch of a simple hydraulic control. PORTO-LIFT ensures movement from bed to wheel chair, bath, and automobile in safety and comfort. With additional accessories every lifting and transfer problem is met.

J. A. PRESTON CORPORATION
New York, New York
Booths 27-28-29

Welcome to our many friends. This year we are showing a new walker with hand brakes, the versatile N-K Exercise Unit, latest A.D.L. equipment, SELECTED BOOKS, and many other interesting products. BE SURE TO REGISTER FOR THE ALL-NEW PRESTON CATALOG #1065, over 200 pages and 1,057 illustrations. THE MOST COMPLETE CATALOG IN THE FIELD.

REHABILITATION PRODUCTS
DIVISION OF
AMERICAN HOSPITAL SUPPLY CORPORATION
Evanston, Illinois
Booths 13-14

Selected products of Physical Therapy Equipment: New Washex Automatic Toilet Seat, Tomac All-Purpose Table, Tomac Snap-On Covers for Hydrocollator Packs, Miller Twister, Tomac Electrotherapy Equipment, Invalid Walkers, American Wheel Chairs, Exercise Equipment and Self-Help Devices. Register for the new R/P Products Bulletin. Our staff is eager to serve you.

W. B. SAUNDERS COMPANY
Philadelphia, Pennsylvania
Booth 35

You are cordially invited to visit the W. B. Saunders Company display of recent publications relating to the field of Physical Therapy.

SIMMONS COMPANY, HAUSTED DIVISION
Medina, Ohio
Booth 34

We invite you to inspect the Hausted Tractionaid. It is electronically controlled and hydraulically operated, offering the ultimate in improved traction therapy. The Tractionaid is the only intermittent traction machine that compensates for the movement of the patient, at exactly the pull and time interval prescribed. SEE IT TODAY.

SPENCER, INCORPORATED
New Haven, Connecticut
Booth 56

Every Spencer Support is individually designed and manufactured according to prescription needs to assist in rehabilitative treatment. You are cordially invited to see samples of our supports or to inquire about supports for the specific requirements of individual patients. Ask about our Emergency Service for patients requiring immediate support.

TECA CORPORATION
White Plains, New York
Booth 33

SEE TECA for the latest in electrodiagnosis and electrotherapy. Low volt generators, ultrasound, chronaxie meters and Teca electromyograph with new photo recording and conduction time testing features will be in operation. Bring your questions.

THERMO-ELECTRIC COMPANY
Cleveland, Ohio
Booth 55

Thermo-Electric Company will display the Dickson Paraffin Baths, pioneered and developed in cooperation with Cleveland Hospitals over a period of 20 years. Noteworthy features are the mahogany mouldings designed for the comfort of the patient; double control of the melting element insuring maximum safety; and improved patented drain.

TRUE-EZE MANUFACTURING CO., INC.
Burbank, California
Booth 47

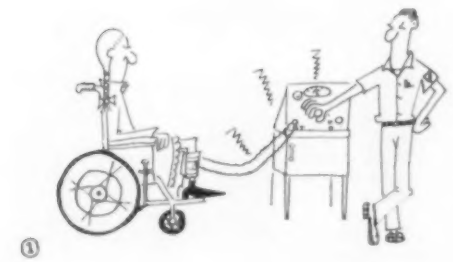
See the TRACTOMATIC portable intermittent traction machine, adaptable to vertical cervical, horizontal cervical, and lumbar traction; the NEW "TRU TRAC" RT-99 traction and therapy table for lumbar and cervical traction; and the "TRU-TRAC" Flexion Traction Chair that provides definite flexion while supporting the low back.

WASHEX DISTRIBUTING COMPANY
Atlanta, Georgia
Booth 39

Washex Automatic Toilet Seat eliminates the need for paper tissue; permits cleansing with warm water and air. Simple installation with only connections to regular 110 volt AC electricity source and water source required. Unit fully tested. Adds dignity to the handicapped.

THE WHITEHALL ELECTRO MEDICAL CO., INC.
Passaic, New Jersey
Booth 5

The Whitehall "one motor" mobile whirlpool bath will be on exhibit. See a personal demonstration of the whirlpool bath combining all essential operations, agitation, aeration and emptying into a single motor driven system. Whitehall manufactures a complete line of hydrotherapy equipment, including wading tanks and therapeutic pools.



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The cartoon this month was contributed by John Morley, physical therapist, of Meriden, Connecticut.

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Pittsburgh's Fortress of Public Health

Guidance in planning the Annual Conference Program, "The Physical Therapist in Industry," has been provided by the University of Pittsburgh's Graduate School of Public Health, a pioneer in the field of occupational health. It is one of the 11 institutions in the United States accredited for public health education. The establishment of the School in September, 1948, was made possible by a gift of $13,600,000 from the A. W. Mellon Educational and Charitable Trust. Under the terms of the gift the School is required to "emphasize occupational and industrial health and hygiene; health generally . . . related to . . . urban industrial areas; and basic research . . ." A statement of the School's policy is contained in the dedication remarks of Paul Mellon: "What is real in the School's program is the quest, the opportunity to know more of man—his body, his mind, his physical and social environment, and the dynamic relationship which we call 'human ecology' or public health."

In 1949, through the cooperation of the Mayor and City Council of Pittsburgh, key faculty members moved into Municipal Hospital adjacent to the University Campus. In this temporary headquarters plans for a permanent building were drawn up, careful recruitment of faculty continued, a basic philosophy was evolved, and research programs were organized in various departments. Even before the first class of students was admitted in September, 1950, the School was fully accredited by the American Public Health Association. Housed in the same building as the new School were the laboratories of Dr. Jonas Salk who was engaged in developing the polio vaccine. Municipal Hospital has since become part of the University and has been re-named Salk Hall.

After an illustrious beginning in its temporary quarters, the School moved into its new permanent building in May, 1957. The eight-story, air-conditioned building and its parking facility occupy an entire city block, and contains an auditorium seating 282 persons, a cafeteria, a library of 42,000 volumes, a student lounge, offices, seminar rooms, and modern research and teaching laboratories.

Distinguished faculty

Dr. Thomas Parran, chief architect of the broad program now in operation at the School, was Dean of the Graduate School of Public Health for its first 10 years, until 1958. His long career in public health included a variety of public health research and administrative assignments, culminating in a 12 year service as Surgeon General of the U.S. Public Health Service, from 1936 to 1948. In 1948 he headed a Mission to the Far East for the United Nations International Children's Emergency Fund. He was President of the United Nations Health Conference in 1946 and Chairman of the U.S. Delegation to the First World Health Assembly in 1948. Dr. James A. Crabtree, long associated with Dr. Parran, succeeded him as Dean.

Others who have influenced the programs in various ways would include Dr. Benjamin Spock, who laid the framework for a program in child psychiatry and child development; Dr. Samuel M. Wishik, Professor of Maternal and Child Health, who is known particularly to those of us who work with crippled children; and Dr. William McD. Hammon, Head of the Department of Epidemiology and Microbiology, who directed the gamma globulin field testing program for poliomyelitis prophylaxis in 1951 and 1952. Dr. Adolph G. Krammer is Head of the Department of Occupational Health, and Dr. Theodore F. Hatch is Professor of Industrial Health Engineering. Dr. Hatch stimulated the formation of a Committee on Human Factors in Engineering within the American Society of Mechanical Engineers. He was primarily responsible for developing the course, "Man and His Environment," a core course in the School. Dr. Harwood S. Belding, of the Department of Occupational Health, served as adviser for a project entitled "Fitting the Job to the Worker," jointly sponsored by the European Productivity Agency and the International Cooperation Administration.

Research program

The research program of the School has many facets and extends beyond the actual boundaries of the School into the community. The Department of Biochemistry and Nutrition is engaged in basic research and clinical studies in chronic

Graduate School of Public Health, University of Pittsburgh

cardiac failure, alcoholism, obesity, atherosclerosis and muscular dystrophy. Clinical studies have been conducted with patients admitted to the Alcoholic Research Ward at St. Margaret's Hospital and with outpatients referred to the Nutrition Clinic at Falk Clinic. The program in Biostatistics is directed at the determination of the interrelated biological and social elements bearing on the health status of families and of the community. With the cooperation of the City Health Department, a selected area of the Arsenal Health District was established as a center for field investigations on the health problems of families and for experiments in the methodology of conducting these investigations. A similar center has been recently organized in nearby Butler County in cooperation with the Health Department of that county to provide opportunities for study based on a rural population. A combined Department of Epidemiology and Microbiology coordinates research activities in the field of infectious diseases, and also encompasses studies on noninfectious or chronic diseases. The principal focus of current investigations in chronic diseases is on rheumatoid arthritis, peptic ulcer, cancer, and methods of estimating morbidity.

Investigation of a variety of problems in administration, both public and institutional, forms the basis for teaching public health practices, which include special programs offered in the fields of environmental sanitation and air pollution, maternal and child health, hospital and medical administration, the behavioral sciences, and public health nursing.

In Occupational Health the School is concerned with interactions between man and his working environment, with the health problems of modern industry, and with problems of industrialized civilization. Continuing objects of study are such general problems as the effect upon health of the introduction of new chemicals and of nuclear fission. Other studies include environmental cancer, respiratory physiology, noise in industry, and responses to physiological stress correlated with aging.

The complex nature of modern industry has increased the need for basing the design of industrial machinery upon an understanding of the human characteristics of the operator, as well as the physical characteristics of the hardware itself. The field of applied science which seeks to establish this understanding of human capabilities and limitations is called ergonomics—literally, the science of man at work. Fitting the job to the man maximizes the productive capacity, safety and well-being of the worker. Such a concept requires studies of lighting, fatigue factors, noise and hearing damage, heat stress, atmospheric contaminants from industrial processes, and other toxic factors and physiological considerations. Cardiac work evaluation clinics are a part of this general area of study.

In addition to the specialty training programs offered by the other departments of the School, the Department of Occupational Health offers training programs in five areas. In Environmental and Work Physiology the focus is in evaluating the effects of impaired respiratory and cardiovascular function or fitness for different kinds of work, and the effects of superimposed thermal stress. In Industrial Hygiene a program is offered for chemists, physicists, and engineers in such fields as noise control, as well as in industrial hygiene engineering and in analytical methods. For physicians there is a course in Occupational Medicine. Other special courses open to a variety of students include those in Toxicology and in Radiation Health. Also in the Department of Public Health Practice there has been established a teaching program in Air Pollution Control, designed to develop in engineers and others an understanding of the basic problems in community air pollution and its control, for persons who will ultimately work in industry or with governmental agencies.

Although the School's programs encompass the many fields of knowledge which bear on the health of man, it functions as an integral part of the larger picture, the University, its Health Center and the Community.

Association News

Shirley M. Lavor, Newark, New Jersey, died Apr. 19, 1960. Mrs. Lavor was a graduate nurse and received her physical therapy certificate at New York University in 1945. She became an active member of the Association in 1945 and until her death was a member of the New Jersey Chapter.

Margaret Morley died Apr. 11, 1960, in Detroit, Michigan, at the age of 49. Mrs. Morley, a graduate nurse, received her physical therapy certificate from Northwestern University in 1951. She was a student member of the APTA and had been an active member since 1951. At the time of her death Mrs. Morley was a member of the Eastern District of the Michigan Chapter.

Enrica C. Nicholson passed away Apr. 20, 1960, after a prolonged illness. Mrs. Nicholson, a graduate in public health nursing, received her physical therapy certificate in 1950 from New York University. She became an active member of the Association in 1950 and has been affiliated with the New York Chapter and the Greater New York District since that time. Mrs. Nicholson was, prior to her death, Administrative Assistant in the Visiting Nurse Association of Brooklyn.

Marriages

Gladys Bierman, of Hartland, Wis., now Mrs. Gladys B. Manke, Hartland.
Mary Brody, of Philadelphia, Pa., now Mrs. Mary B. Dickler, Philadelphia.
Marilyn J. Brown, of Bridgeport, Conn., to Joseph D. Shields, III, Concord, N.H.
Ann R. Burnet, of San Francisco, Calif., now Mrs. Ann B. Paulsen, Daly City, Calif.
Ann S. Calkins, of Buffalo, N.Y., to Charles Brenner, Buffalo.
Eleanor N. Casey, of Needham Heights, Mass., now Mrs. Eleanor C. McQueeney, Lakeville, Mass.
Margaret A. Ciarfella, of Watertown, Mass., now Mrs. Margaret C. Lynch, Brockton, Mass.
Margaret Clark, of San Diego, Calif., now Mrs. Margaret C. Bobertz, San Diego.
Shirley Cloninger, of Durham, N.C., to J. Gordon Fisher, Durham.
Kay Comer, of Fort Wayne, Ind., to Richard Kenney, West Haverstraw, N.Y.
Jeanette Cook, of LaCrosse, Wis., to Edward Fontaine, LaCrosse.
Carlyn Daughters, of Honolulu, Hawaii, now Mrs. Carlyn D. Dasinger, Honolulu.
Esther Day, of Fort Leavenworth, Kans., now Mrs. Esther D. McBroom, Fort Leavenworth.
Gay M. DeLong, of Chicago, Ill., to William H. Goodhart, Chicago.
Ellidee Dotson, of Houston, Tex., now Mrs. Ellidee D. Thomas, Houston.
Constance Draper, of Culver City, Calif., to Charles Osterlund, El Segundo, Calif.
Mary M. Dubbs, of Ann Arbor, Mich., now Mrs. Mary D. Helms, Ann Arbor.
Theoda L. Eckert, of Euclid, Ohio, now Mrs. Theoda E. Severy, Euclid.
Ann Feldman, of St. Charles, Mo., to Carter Freeman, St. Louis, Mo.
Ann T. Ferris, of Blue Ash, Ohio, now Mrs. Ann F. Staley, Cincinnati, Ohio.
Jacqueline M. Fike, of Pittsburgh, Pa., now Mrs. Jacqueline F. Leonardi, Pittsburgh.
Betty Fong, of Oakland, Calif., now Mrs. Betty F. Chang, San Francisco, Calif.
Lu Lynn Galt, of Greenville, S.C., to Joel S. Sexton, Spartanburg, S.C.
Taimi T. Grekula, of Topeka, Kans., now Mrs. Taimi G. Jones, Topeka.
Beryl M. Hanbidge, of Winston-Salem, N.C., now Mrs. Beryl H. Lipe, Winston-Salem.
Marsha Hearn, of Ottawa, Ill., now Mrs. Marsha H. Smith, Salina, Kans.
Jean A. Holmes, of Berkeley, Calif., to R. A. Finke, Redwood City, Calif.
Lily Homrighausen, of Milwaukee, Wis., now Mrs. Lily H. Schmidt, Milwaukee.
Elizabeth E. Ives, of Bladensburg, Md., now Mrs. Elizabeth I. Doster, Princeton, N.J.
Carol A. Jones, of Durham, N.C., now Mrs. Carol J. Coggin, Greensboro, N.C.
Marcia A. Juday, of Garland, Tex., now Mrs. Marcia J. Vaile, Galveston, Tex.
Harriett Kraemer, of Berwyn, Ill., now Mrs. Harriett K. Potenza, River Forest, Ill.
Patricia J. Kramer, of Oakland, Calif., to H. D. Pace, El. Cerrito, Calif.
Phyllis J. Meeker, of Mt. Clemens, Mich., now Mrs. Phyllis M. Swisher, Mt. Clemens.
Marguerite Metz, of Dallas, Tex., to F. Eugene Halaburt, Dallas.
Odile M. Montague, of Watertown, Mass., now Mrs. Odile M. Mailhiot, Watertown.
Ruth A. Neb., of San Bernardino, Calif., now Mrs. Ruth N. Hume, San Bernardino.
Marilyn Ott, of Chicago, Ill., to Charles R. Ratay, Glen Ellyn, Ill.
Norma J. Passmore, of Hermosa Beach, Calif., now Mrs. Norma P. Shanbour, Long Beach, Calif.
Janis T. Resnick, of Bedford, Mass., now Mrs. Janis T. Johnson, Hudson, N.H.
Marjorie B. Rinfrett, of Meriden, Conn., now Mrs. Marjorie R. Primavera, Hartford, Conn.
Suzanne H. Roth, of North Hollywood, Calif., now Mrs. Suzanne R. Larky, Venice, Calif.
Faith H. Rotta, of Milwaukee, Wis., now Mrs. Faith R. Hench, West Allis, Wis.
Elise Rutledge, of Chapel Hill, N.C., now Mrs. Elise R. Bradford, Chapel Hill.
Dawna Sander, of West Haverstraw, N.Y., now Mrs. Dawna S. Buckhout, South Nyack, N.Y.

Jean Saufley, of Fort Wayne, Ind., now Mrs. Jean S. Walmsley, Fort Wayne.
Evelyn J. Sawyer, of Cheyenne, Wyo., now Mrs. Evelyn S. Dunkelberg, Cheyenne.
Beryl L. Schulman, of San Francisco, Calif., to Sanford J. Feinglass, San Francisco.
Barbara A. Sheridan, of Orange, N.J., now Mrs. Barbara S. Appleton, Orange.
Arlyn L. Shevling, of Cheyenne, Wyo., now Mrs. Arlyn S. Newman, Cheyenne.
Ann Shipman, of Bethlehem, Conn., to G. Judson Wells, Jr., Meriden, Conn.
Norma J. Sinesio, of Modesto, Calif., now Mrs. Norma S. Stensaas, Laramie, Wyo.
Joy Smith, of Boston, Mass., now Mrs. Joy S. Stone, Brookline, Mass.
Kathleen E. Spell, of Denver, Colo., now Mrs. Kathleen S. Casey, Denver.
Elizabeth P. Streit, of Brookline, Mass., now Mrs. Elizabeth S. Mulligan, Barrington, R.I.
Patricia Terrey, of Richmond, Va., to Thomas O. Hubbard, Richmond.
Virginia Van Ark, of Fort Wayne, Ind., now Mrs. Virginia V. Scott, Fort Wayne.
Susanne C. Weber, of Brentwood, Mo., now Mrs. Susanne W. Young, St. Peters, Mo.
Genevieve Welch, of Polson, Mont., now Mrs. Genevieve W. Parrett, Polson.

Chapter News

Santa Barbara—California

Neuromuscular Problems Related to General Tension States and Physical Therapy in the Treatment of Rheumatoid Arthritis were the speakers' topics for the California Chapters' annual convention in Santa Barbara, March 26-27.

Southern California

The Chapter sponsored an educational booth at the meeting of the Association of Western Hospitals in Los Angeles, April 25-28.

Georgia

At the annual Chapter meeting on April 9 the program topics were: Muscle Reeducation in Athletes and Fatigue Syndromes; Hips in Cerebral Palsy; Role of Photography in Medicine and Physical Therapy; and Technics in Ultrasound Therapy. For the business meeting that day, the newsletter reminded "Let us not have a minority of members deciding issues for the absent majority."

Illinois — Northern District

Welcome to the newest component district! Illinois members who reside or work in Lake and McHenry Counties are members of this District. The Association is now comprised of 58 chapters and 50 districts.

Iowa

The newsletter reports that letters were sent to 90 high schools two weeks prior to a TV showing of *The Return* so that students could plan to view the film.

A portion of the Tri-State Meeting, held in Des Moines April 22-23, was devoted to a discussion of physical therapy problems and methods to alleviate them as seen on the local, district, state, and national levels.

Kansas

At the Chapter's first educational workshop, a panel discussion on state and community resources concluded the two day meeting. Members of the panel represented vocational rehabilitation, Kansas Crippled Children's Commission, Kansas Society for Crippled Children and Adults, public health nursing and Department of Special Education—Board of Education.

Maryland

During the past months the Chapter meetings have included a tour of a hospital wing set up for training patients in how to manage at home, an illustrated report of the meetings of the Third Congress, World Confederation for Physical Therapy, and scientific lectures. Among the lecture topics were: Vocational Rehabilitation, Amputee Clinic—Team Approach, Pediatric Neurosurgery, and Properties and Function of Normal and Abnormal Muscles.

The meeting announcements provide other brief items of interest, a comment to stimulate meeting attendance, and an interpretation for the initials APTA—Active Participation Tops All.

Massachusetts

Sling suspension therapy, a discussion with demonstrations, was given on April 5. Members attending the meeting received a pamphlet on the topic at the end of the evening.

Members of the Chapter's Ways and Means Committee have undertaken their spring project of selling gift wrapping paper and *Review* volume files. Income from these sales will be used to send one of the members to a course or institute.

Massachusetts — Western District

April 23 was the date for the District's institute on physical therapy at the Pittsfield General Hospital. The topics discussed were: acute cerebral vascular accidents; psychological aspects of the CVA patient; hypnosis in conjunction with physical therapy; neurological signs; and polyneuritis, Icelandic disease, and others.

Michigan — Eastern District

The Gait and Bracing of the Hemiplegic Patient, the topic of a two day workshop in late January, included technical background, characteristics of the hemiplegic, braces, presentation of patients, and exchange of ideas and technics.

Michigan — Western District

A brief report of a District survey of personnel policies was included in the January-February newsletter. Fifty-three per cent of the members responded to questions on salary, hours per week, years in physical therapy, and fringe benefits.

Minnesota

Two members attended a Public Health and Rest Home meeting. They made a report of this experience during the February Chapter meeting.

Western Missouri

Members attending the April 23 and 24 Chapter meeting heard discussions on "A New Operative Procedure for Scoliosis," "Athletic Injuries —Diagnosis and Treatment," "The Aging—A Problem and a Challenge," and "Medical Hypnosis."

New York

The Chapter's annual meeting held in Rochester, May 20-21, included: Hypnosis and Rehabilitation presented by a dentist, an anesthesiologist, an orthopedist, and a surgeon. Members also joined the regular Eastman Kodak Company tour and then visited the Kodak Medical Department.

The Chapter newsletter asks the reader, "Have you re-read your Code of Ethics this month? This year?"

New York — Hudson Valley District

On April 14, a symposium on public health physical therapy was presented by three members who are employed by health departments.

The District newsletter submits this conversation piece. "Yes I know why people *don't* go to the APTA meetings, but why do they go?— 'cause we're hostesses, 'cause all my friends go, 'cause they have good food, 'cause we're hostesses, 'cause I'm on a committee, 'cause I want to hear the speaker, 'cause it advances me professionally."

North Carolina

A map in the newsletter directed the members to the site of the April 22-23 Chapter meeting and included the direction "North to Pittsburgh and the Point." The three concurrent scientific topics for the meeting were: burns; nonsurgical heart conditions; and medicolegal responsibilities of physical therapy departments.

Ohio — Northwestern District

The members are preparing a physical therapy booklet in which all departments in the Toledo area will be listed.

Ohio — Southwestern District

Dr. Joseph Levinson presented the topic, "Arthritides" at a combined meeting of the District and Kentucky Chapter members held on Apr. 9, 1960.

South Carolina

The midwinter Chapter meeting, held in Columbia, included clinical sessions on treatment by electrical stimulation and the use of iontophoresis.

Texas — West Texas District

Prephysical therapy club members from colleges in the area and other interested persons were guests at the District's March meeting where the President of the APTA and the President of the Texas Chapter were the guest speakers.

Members' Publications

Sara J. Houtz is co-author with William H. Blodgett, M.D., of an article entitled "Clinical and Electromyographic Evaluation of Patients with Anterior Transposition of Peroneal Tendons," published in the *Journal of Bone and Joint Surgery*, January, 1960.

Advisory Committee on Chapter Activities

Sixth Annual Meeting

The Advisory Committee on Chapter Activities held its annual meeting Jan. 28-30, 1960, in the National Office in New York. At that time James Zimmerman, Ohio Chapter, was introduced and welcomed as a new committee member.

During the three day session, there were reports from the consultants in the various departments of the National Office. Each report was designed to acquaint the committee members with the activities that are related to the chapters and the membership of the Association.

As part of a concerted effort by the consultants who serve the members of our organization to understand local needs and help with problems and plans, 30 visits have been made to chapters and/or districts. It is their plan that each component of the Association will receive such a visit at least every three years. Since it has been impossible from the standpoint of time and expense to visit each local group, carefully selected and appropriately planned bulletins and memos have been distributed.

One of the major functions of this Committee is to act in an advisory capacity to chapters through the Chapter and Membership Department. Each year executive committees are invited to submit items that they wish considered by the Advisory Committee on Chapter Activities. This year 21 questions or problems were submitted and these were discussed and acted upon. The results of the Committee's opinion have been directed to the respective chapter. Even though several inquiries were directed toward the age-old problems of program planning and membership participation, there were many more requests for assistance in operational technics and interprofessional relationships.

Legislative progress is always of prime importance to each of us. At the present, 36 states have enacted legislation and of these 23 are using the P.E.S. Examination. Several of the chapters are engaged in legislative activity, while others are either defending or amending existing legislation. Representative members of each state are reminded of the special meetings during the June Conference—one session for members of State Examining Committees and one for those seeking legislative assistance.

The foreign-trained physical therapists must be carefully considered as we enact or modify our laws. Appropriate consideration should be given to the best method for evaluating their qualifications and training, as well as identifying their role in relation to our country, our states, and our Association. Each member of the American Physical Therapy Association should know the status of the foreign-trained therapist in his own community and the relationship that this person has to existing state laws and participation in the Association's activities.

At the request of the Board of Directors the Committee reviewed the requirements for inactive membership. The Committee was informed that as of October, 1959, 2,060 physical therapists were inactive members. This information precipitated a lengthy discussion of inactive membership, including the reasons for this proportion of the members to be inactive and the methods that could be used to reduce this number by effecting a shift to active membership. Based on the discussion, the Committee's recommendations have been submitted to the Board of Directors.

As part of the plan in the National Office to evaluate the various services and their effectiveness, the use of recruitment materials by the chapters and members was discussed. The discussion centered around the effectiveness of the present materials as a recruitment tool, how this information is distributed and to whom, the best method for distribution of these materials, and a procedure to financially aid this service. Each Executive Committee and each Recruitment Chairman of the Association is in a position to serve as an evaluator, and your suggestions and comments would be most helpful.

The future advancement of the Association is of prime importance and individual achievement is certainly a contributing factor. So it is that each member of the organization is encouraged to review his educational background. With the increased emphasis on educational qualifications, the Committee considered some of the implications that this has for its members. Are we keeping abreast of the advancements in the related health fields? Are we encouraging our members to possess at least a baccalaureate degree? Are we recommending advanced or graduate education for many others? These it would seem are some of the questions that we have answered. Many have recognized the need for educational advancement and have taken appropriate steps. Mary McMillan, our first President of the Association, expressed her belief in high standards of education by providing a scholarship fund.

The Chapter and Membership Department has been busy preparing a chapter manual. A new

format and a revision of the operational procedure has taken place. It is anticipated that one of the major sections will be ready for distribution later this year. The Committee is serving in an advisory capacity for this project.

The Board of Directors requested that the Committee review chapter directories recognizing that each chapter directory serves a specific purpose and that the needs or purposes vary from chapter to chapter. There are certain essential features, however, that should be included in each directory. After reviewing the chapter directories, the Committee outlined recommendations that would be useful in the preparation of future directories. The recommendations include content, desirable identification of active and inactive members, and use of advertising. These recommendations will be made available to the chapters and should prove helpful in the preparation of future editions.

The Board of Directors had requested that the Advisory Committee on Chapter Activities consider the desirability of having a joint meeting with the other advisory committees of the Association. Since there are many overlapping problems, such a meeting would offer an opportunity to coordinate the study of and action on questions of mutual concern. However, this Advisory Committee believes that each committee should discharge its specific responsibilities and then consider the problems that have broader implications for all advisory committees. The socioeconomic areas and their effect upon the membership were thought to be a likely subject for such a meeting and could be discussed jointly.

The 20 responses on Chapter Workshop Comment Sheet materially aided the Committee in drafting plans for the Pittsburgh Conference Chapter Workshop. A variety of suggestions were made but the most concerned leadership, parliamentary procedure, and programs. Any one of these topics is worthy of a whole workshop; but the Committee accepted the challenge to see whether all these could be included. On this basis an unusual and interesting session has been planned. See you all there!

All members of the Advisory Committee on Chapter Activities attended all sessions. Each member recognizes his responsibility and expresses his desire to serve effectively on this Committee.

DOROTHY PAGE
WAYNE PERDUE
ELLEN SMITH
JAMES ZIMMERMAN
HELEN BLOOD, *Chairman*

New Student Members

Boston University

Nancy C. Ackerman
Alma R. Anderson
Sylvia L. Beerli
Joyce G. Brenin
Ruth A. Chapman
Noreen E. Claus
Barbara E. Collins
Andrew H. Dearth
Barbara E. Dietrich
Shirley A. Doucette
Helen P. Ducharme
Jean E. Erickson
Helen J. Flaherty
Linda M. Fuqua
Elizabeth A. Halpin
Eleanor S. Hardy
Susan E. Hayes
Diane Hutchings
Ann M. King
Marilyn M. Koch
Lynne Koropsak
Sonia M. Lelet
Gail L. Marchant
Donna L. McGonigle
Rita T. Mecagni
Nancy G. Needham
Irene A. Nisbet
Robert A. Powers
Norma J. Pratt
Elva M. Rodenhizer
Margaret A. Rowell
Janet D. Smerage
Joann F. Stevens
Lynne S. Steventon
Heidi Thomann
Frances E. Van Hook
Ruth A. Weissman
Leila J. Wilson

Indiana University

Mary A. Barbre
Sonya M. Brown
Amelia A. Frankenfield
Margaret C. Gardner
Wayne L. Hayes
Judith A. James
Barbara J. Shepard
Judith C. Troyer
Letitia A. Wolcott

Marquette University

George M. Wolff

New York University

Martin J. Jaeger

Simmons College

Mary L. Auerbach
Nancy D. Beswick
Natalie E. Beemus
Lynette S. Chandler
Katherine M. Cooper
Elizabeth Donovan
C. Jane Duffin
Judith Freeman
Joanna M. Hawkins
Beverly A. Hendrickson

United States Army

Ann E. Brookover
Jolene R. Smith

U.S. Army MFSS

Ann Crawford

University of Connecticut

Pamela J. Hawley

University of Minnesota

Richard A. Teschner

University of Pennsylvania

Helen Hultberg

University of Southern California

Sandra L. Baker

University of Wisconsin

Mary L. Gresbach

Education

Guide to Graduate Education

A list of suggested areas of graduate study and some universities offering this work, first published in the April 1960 *Review*, will hereafter appear four times annually in the issues of January, April, July and October. The listing and date of its most recent publication will be identified each month in the Table of Contents under Regular Features.

APTA-OVR Graduate Study Traineeships for Physical Therapists

The Graduate Study Committee is thrilled to announce that the APTA-OVR Graduate Study Traineeships for Physical Therapists are to be continued. A grant has been received from the Office of Vocational Rehabilitation for the 1960-61 year.

July 1, 1960 has been designated as the deadline for applications from members who wish to begin full time graduate study at the beginning of the fall term. Information and application forms may be obtained from:

Department of Professional Education
American Physical Therapy Association
1790 Broadway
New York 19, New York

SHORT TERM COURSES FOR GRADUATE PHYSICAL THERAPISTS

Title of Course	*Sponsor of Course*	*For Details Contact*	*Dates of Course*
Cerebral Palsy	The North Carolina Cerebral Palsy Hospital Durham, North Carolina	Dr. Lenox D. Baker Medical Director No. Carolina C. P. Hosp. Durham, North Carolina	Courses arranged according to individual need—duration 3 months
Physical Therapy in the Care of Neuromuscular Disease	Georgia Warm Springs Foundation Warm Springs, Georgia	Robert L. Bennett, M.D. Medical Director Ga. Warm Springs Found. Warm Springs, Georgia	January April October
Technics of Neuromuscular Reeducation	California Rehabilitation Center Vallejo, California	Margaret Knott, Chief P. T. Calif. Rehab. Center Vallejo, Calif.	January 1 April 1 July 1 October 1
The Third International Prosthetics Course (742 I)	Prosthetics Education, PG-MS New York University in cooperation with the International Society for the Welfare of Cripples 550 First Avenue New York City	Dr. Sidney Fishman	August 15—26, 1960
P.T. 502-a—Anatomy for Therapists	University of So. California Physical Therapy Department University Park Los Angeles 7	Mrs. Roxie Morris Professor of Physical Therapy	August 1—26, 1960
P.T. 511 Neurophysiology in the Treatment of Neuromuscular Dysfunction	University of So. California Physical Therapy Department University Park Los Angeles 7	Margaret S. Rood Head	July 11—29, 1960
Treatment for the Cerebral Palsied	Children's Rehabilitation Institute for Cerebral Palsy Reisterstown, Maryland	Christopher H. Wiemer Executive Director Children's Rehab. Inst. Reisterstown, Maryland	July 5—Sept. 16, 1960 Oct. 3—Dec. 16, 1960

Schools Offering Courses in Physical Therapy

APPROVED BY THE COUNCIL ON MEDICAL EDUCATION AND HOSPITALS OF THE AMERICAN MEDICAL ASSOCIATION

Schools offering the four year program leading to a baccalaureate degree accept high school graduates and transfer students. Schools offering the 12 to 16 months' program leading to a certificate accept students who have completed all or most of their undergraduate work providing they meet certain course requirements. Recipients of a degree and/or certificate have equal professional status. For specific information regarding each school's entrance requirements, curriculum, tuition and other fees, write to the physical therapy director indicated below. All students should investigate course requirements *early*.

	Degree	*Certificate*
CALIFORNIA		
Mary J. Dodge School of Physical Therapy Childrens Hospital Society 4614 Sunset Boulevard Los Angeles 27	‡	†
Ronald A. Hershey School of Physical Therapy College of Medical Evangelists Loma Linda	†	†
Lucille Daniels Division of Physical Therapy School of Medicine Stanford University Stanford (Palo Alto)	†	†
Margery L. Wagner Curriculum in Physical Therapy University of California The Medical Center San Francisco 22	†	†
Margaret S. Rood Department of Physical Therapy University of Southern California Los Angeles 7	†	†
COLORADO		
Dorothy Hoag Curriculum in Physical Therapy University of Colorado Medical School Denver 20	†	†
CONNECTICUT		
Frances M. Tappan School of Physical Therapy U 101 University of Connecticut Storrs	†	
ILLINOIS		
Elizabeth C. Wood Course in Physical Therapy Northwestern University Medical School 303 East Chicago Avenue Chicago 11	†	†
INDIANA		
Frances C. Ekstam Physical Therapy Program School of Medicine Indiana University Medical Center Indianapolis 7	†	
IOWA		
Olive C. Farr Physical Therapy State University of Iowa Hospitals Iowa City		†
KANSAS		
Ruth G. Monteith Section of Physical Therapy Education University of Kansas Medical Center Kansas City 12	†	†
MARYLAND		
Gladys E. Wadsworth, Ph.D. Department of Physical Therapy School of Medicine University of Maryland Baltimore 1	†	
MASSACHUSETTS		
Adelaide L. McGarrett Physical Therapy Department Boston University Sargent College University Road Boston 15	†	†
Constance K. Greene Department of Physical Therapy *Bouvé-Boston School, Tufts University Medford 55	†	
Shirley M. Cogland *Program in Physical Therapy Simmons College The Fenway Boston 15	†	†
MICHIGAN		
Virginia Wilson Curriculum in Physical Therapy The University of Michigan University Hospital Ann Arbor	†	†
MINNESOTA		
Dale V. Shaffer School of Physical Therapy Mayo Clinic Rochester	‡	†
Wilbur L. Moen Course in Physical Therapy University of Minnesota 860 Mayo Memorial Building Minneapolis 14	†	

* Accepts women students only.

‡ Baccalaureate degree available from an affiliating college or university.

	Degree	Certificate
MISSOURI		
Sr. M. Imelda, S.S.M. Department of Physical Therapy St. Louis University 1325 South Grand Boulevard St. Louis 4	†	
Beatrice F. Schulz Department of Physical Therapy Washington University School of Medicine 660 So. Kingshighway St. Louis 10	†	
NEW YORK		
Dorothy L. McLaughlin Russell Sage College-Albany Medical College Division of Physical Therapy Albany 8	†	†
Mary E. Callahan Courses for Physical Therapists Columbia University College of Physicians & Surgeons 630 West 168th Street New York 32	†	†
Elizabeth C. Addoms Physical Therapy Curriculum School of Education, New York University Washington Square East New York 3	†	†
Mildred F. Heap Program in Physical Therapy University of Buffalo 3435 Main Street Buffalo 14	†	†
NORTH CAROLINA		
Helen Kaiser Division of Physical Therapy Box 3247, Duke University Medical Center Durham		†
Margaret L. Moore Section of Physical Therapy School of Medicine University of North Carolina Chapel Hill	†	
OHIO		
Robert D. Kruse, D.P.E. Course in Physical Therapy Frank E. Bunts Educational Institute 2020 East 93rd Street Cleveland 6	‡	†
Gladys G. Woods Curriculum of Physical Therapy Ohio State University University Hospital Columbus	†	†
OKLAHOMA		
Thelma Pedersen School of Physical Therapy University of Oklahoma, Medical Center Oklahoma City 4	†	†
PENNSYLVANIA		
Dorothy E. Baethke Division of Physical Therapy University of Pennsylvania 3901 Pine Street Philadelphia 4	†	†
Kathryn Kelley Division of Physical Therapy D. T. Watson School of Physiatrics Leetsdale	‡	†
PUERTO RICO		
(All classes given in Spanish) Lutgarda V. Piñeiro School of Physical & Occupational Therapy Candelaria & Mandry Streets Stop 22, Santurce	†	†
TEXAS		
Doris E. Porter Grady Vaughn School of Physical Therapy Baylor University Medical Center Dallas 10	†	†
Cecelia J. Lee School of Physical Therapy Hermann Hospital Houston 25	‡	†
Ruby Decker School of Physical Therapy The University of Texas Medical Branch Galveston	†	†
VIRGINIA		
Susanne Hirt School of Physical Therapy Medical College of Virginia Richmond 19	†	
WISCONSIN		
Beth J. Phillips Curriculum in Physical Therapy Marquette University School of Medicine 561 North 15th Street Milwaukee 3	†	
Margaret Kohli Course in Physical Therapy University of Wisconsin Madison 6	†	
U. S. ARMY MEDICAL SERVICE		
*Physical Therapy Course Army Medical Service School Brooke Army Medical Center Fort Sam Houston, Texas Write to: The Surgeon General Department of the Army Washington 25, D.C. Att.: Personnel Division		†

* Accepts women students only.

‡ Baccalaureate degree available from an affiliating college or university.

Please direct all inquiries regarding tuition, entrance requirements and other specific information to the school and *not* to the American Physical Therapy Association.

Abstracts

The Orthopedic and Prosthetic Appliance Clinic Team

Everett J. Gordon (Veteran's Administration, Washington, D.C.), J. INTERNAT. COLL. SURG., 33:181-192 February 1960

The number of amputees in the United States has now risen to a significant height as a result of two world wars, the Korean Conflict, increased military activities, and a vast number of automobile and industrial accidents. The amputee program and the associated need for artificial limbs have become an important segment of a medical care program. In 1949 the Veteran's Administration offered an indoctrination course for the training of personnel to organize special orthopedic and prosthetic appliance clinics in order to provide the best possible service for its amputee veterans. It was recognized that a trained team of specialists could provide better service than each specialist working alone by individual consultation.

The purposes of the orthopedic team operating in a special clinic are: 1) to provide adequate medical supervision of fitting and adjustment of orthopedic appliances, 2) to provide proper training and treatment relative to the furnishing of orthopedic appliances, 3) to act as an extension in field testing and appraisal of orthopedic devices resulting from research, and 4) to effect an economy of expenditures in the issue and maintenance of orthopedic appliances. In addition, the clinic team functions in cooperation with hospital services, making recommendations for surgical correction of deformities and aiding in the proper care of amputees, such as preventing contractures and undesirable stumps that would make the fitting of a prosthesis difficult.

The typical prosthetic team is composed of an orthopedic surgeon, physiatrist, physical therapist, administrative assistant, orthotist, prosthetist, and occupational therapist. The amputee himself should be considered a part of the team.

The author outlines the qualifications and duties of each member of the clinic team. It is stated that in the first Pilot Clinics, the physiatrist was assigned to the team as the orthopedic surgeon's first assistant. In most clinic programs today, however, this member of the team has been eliminated and a portion of his duties assigned to the physical therapist. In some civilian rehabilitation programs, the directive role has been assumed by well trained physiatrists. It is the opinion of the American Academy of Orthopedic Surgeons that rehabilitation of orthopedic problems should properly be dictated by an orthopedic surgeon who is best qualified by his training to understand all facets of these problems.

In many instances where an occupational therapist is not available, the physical therapist assumes these duties as well as directly supervises all of the training of the amputee in the use of his new prosthetic device.

The use of such clinic teams has facilitated the proper prescription of prostheses, orthopedic appliances and special shoes, to the increased satisfaction of the patient, the prescribing physician, and the purchaser. Rehabilitation of the amputee has made definite progress.

Survival of Sympathetic Nervous System after Spinal Cord Injury as Measured by Sweat Mechanism

Benjamin Koshes and Herman Blustein (Department of Neurology and Psychiatry, Northwestern University Medical School, Chicago), A.M.A. ARCH. NEUR. 2:163-171, February 1960

With the increased span of life for patients with spinal cord injuries following World War II and the Korean War, the survival of the functional activity of reflex arcs has indicated that the "late" stage is no longer the "terminal" stage of early writers such as Head, Riddoch, Lhermitte, and Thomas. Most attention has been focused on somatic structures. Indications are that the autonomic nervous system, particularly the sympathetic, like somatic nerves, recovers after the period of spinal shock and survives when connected to the distal segment of the cord.

Sweating, as a single aspect of sympathetic function, could be studied objectively and methods were established to investigate thermoregulatory, drug, and reflex sweating.

Hot tea and acetylsalicylic acid followed by placing the patient in a heat cradle for one-half hour elicited sweating regulated by thermoregulatory impulses from the hypothalamus carried along the thoracolumbar sympathetic chain.

Drug sweating was induced with pilocarpine, metacholine (Mecholyl), or furtrethomium iodide (Furmethide) which act postganglionically on nerve endings of the so-called "cholinergic fibers," described by Dale and Feldberg. List and Peet believe that two sets of cholinergic fibers exist, postganglionic sympathetic and parasympathetic, and thus drug sweating can persist in an area which has lost its postganglionic sympathetic supply but retains its parasympathetic supply intact.

Spinal reflex sweating is pathologic and considered as a release phenomenon, a component of the spinal mass reflex, evoked by an afferent impulse entering the distal portion of the cord, mediated through this distal stump and peripherally by the thoracolumbar sympathetic nervous system.

The Minor iodine or Guttmaun quinizarin technics were used to bring out the sweat reaction in color.

Twenty-six patients with spinal cord injuries were studied.

1. Physiologically complete lesions, anatomically incomplete—15
2. Anatomically complete lesions.
   a) Spinal cord only—1
   b) Spinal cord and cauda equina—1
   c) Spinal cord and anterior and posterior root rhizotomy—1
   d) Spinal cord with pre- and postganglionic sympathectomy—1
3. Physiologically incomplete lesions—7

Because of the wide source of preganglionic sympathetic fibers to a given region plus the multiple-connection possibilities for each of them, before concluding that a given anatomical zone is retaining its original sympathetic innervation, one must be certain it is not depending on overlapping nerve supply. This can be done by testing for the integrity of the sweat glands (drug sweating), for levels down to the lesion (heat sweating), and for levels up to the lesion (reflex sweating). Perilesionary sweating is occasionally available as a special aid. Hyndman and Wolkin consider this a compensatory overactivity in normally sweating zones for maintenance of body temperature when sweating is abolished over a large part of the body.

It was found that thermoregulatory sweating was abolished below a complete spinal cord interruption, be this anatomical or physiologic, but the extensive distribution of

preganglionic fibers may reduce or even eliminate any heat-sweating loss. Drug sweating was always present, being very heavy in instances of complete lesions. Most hyperhydrosis was an example of pathologic reflex sweating which was evoked by distension of the bladder in every instance except the case with the total rhizotomy, anterior and posterior roots at the tenth thoracic vertebra, which prevented any bladder signal from reaching the cord isolated below the eighth thoracic vertebra. Reflex sweating correlated with somatic defense synergias in complete lesions in 13 out of 18 cases. No true mass reflexes were seen.

Results indicated that the sympathetic nervous system has a tremendous ability to survive even when separated from its central connections for as long as nine years.

Rehabilitation of Knee Stability Through Muscle Strengthening

Oscar O. Selke, Jr. (Hermann Hospital, Houston, Texas), ORTHOPEDICS, 2:21-24, January-February 1960

The author first reviews several pertinent factors regarding knee function, then discusses exercise technic for the knee. During function, the muscles are constantly working to maintain stability and proper position as the entire weight of the body is placed on the knee through the femur and an equal counterforce is applied from the floor through the tibia. The cruciate ligaments form a moving axis which controls anteroposterior movements of the tibia on the femur. Rotary and lateral stability is dependent on the peripheral ligaments and muscles. Rotary stresses occur during walking and during moving from sitting to standing position.

During walking, the knee is extended by momentum of the hip flexion movement. During standing, the triceps surae act as a knee extensor by producing a downward thrust on the knee. The quadriceps is responsible for absorption of shock of deceleration of forward momentum of the body on the foot as the heel strikes the ground. This is the primary function of the quadriceps in walking. Maximum hamstring activity occurs just before the heel strikes the ground in order to slow down the passive forward momentum of the leg initiated by hip flexion. The hamstrings also assist hip extension after the foot is on the ground, and they flex the knee at the beginning of the swing phase. All this points out that the major activity of the quadriceps and hamstrings is in stabilizing the knee during passive movements thrust upon it through the femur and tibia. A person may participate in normal activity and even in sports with a weak quadriceps by substituting power from the triceps surae and hip extensors, but the knee is not well supported and may suffer repeated trauma.

Deficient muscle strength is based on (1) failure to activate an adequate number of motor units of the nervous system; or (2) inadequate strength of the muscle tissue. Reference is made to a recent article by Rose in which he suggested that persistence of strength might be due to persistence of a learned act in the nervous system. There is also evidence that the strength of muscle contraction is dependent on proprioceptive bombardment of the brain (DeLorme and Watkins). Pain is another important nervous factor affecting muscle strength. The fact that atrophy of the quadriceps in the presence of pain is more rapid than ordinary disuse atrophy, suggests dissociation of motor stimulus.

Progressive resistance exercise is discussed. It is emphasized that resistance should be added only when the muscle has sufficient ability for contraction through its normal range of extension. In progression to P.R.E. patients may be started on quadriceps setting, sitting-standing exercise, hamstring exercise against passive resistance of the rectus femoris, and gastrocnemius exercise by using the body weight as resistance.

Spondylolysis in the Aged

Nathan Hilel, Izidor Alkalaj and Ithamar Aviad (Hebrew University-Hadassah Medical School, Jerusalem, Israel), GERIATRICS, 15:187-197, March 1960

In a radiologic study of 125 unselected old persons over 65 years of age in old age homes in Jerusalem, the 12 per cent frequency of spondylolysis is higher than the accepted incidence of 5 per cent for white people.

This is explained by the theory of the development of spondylolysis by compression of the isthmuses by the articular processes of the vertebrae above and below them. The aging process is considered to have an important influence through the flattening of the vertebral bodies and thinning of the intervertebral disks.

Rehabilitation of the Elderly Patient

Marjory W. Warren (Geriatric Unit, West Middlesex Hospital, Isleworth, Middlesex, England), ANN. PHYS. M., LOND., 5:170-181, February 1960

A knowledge of the conditions likely to occur in the elderly sick, and the most effective methods of preventing deterioration during illness are essential to both specialist and general practitioner. To be successful, care often requires the attention of a therapeutic team with good personal contact and moral support; and recognition of multiple pathology as the norm.

Deterioration may begin with a well meant suggestion that the elderly person relinquish duties and responsibilities which he could well continue. As morale drops, dependency grows, and the load on family and friends increases. Keeping the old person in bed may seem an appealing method of easing care. Joint stiffness is thus encouraged, interest in surroundings flags, and daytime drowsing follows. Sleeplessness at night may be corrected by sedatives which often confuse the patient. Water intake is reduced, often with resultant slight uremia and further confusion and perhaps incontinence. Further sequelae are all too familiar.

Prevention is based on maintenance of activity both mental and physical. Decisions as to choice of dress and food contribute to a feeling of independence. Keeping the patient out of bed and dressed, or at least on the bed rather than in it is vital. Use of aids to deal with incontinence and making self care and feeding possible without help, further promote independence and therapeutic motion through useful and responsible activity. Hearing aids, glasses, and other aids should be worn regularly.

Ambulation training should begin with bed exercises, progress through exercises performed while standing at the foot of the bed, to ambulation in parallel bars—and then to walking unassisted. Functional training and use of assistive devices must be highly individualized with care to prepare the patient for the home situation to which he will return.

The speech therapist and occupational therapist may do much to further increase the patient's independence in self care and communication. The use of a pylon rather than prosthesis is recommended for many older amputees, and the need for follow-up clinics for all these patients is stressed. By extending the training in self care to the wheel chair or bed bound patient, further deterioration can be minimized and the load on family and friends reduced.

Myopathy in Cushing's Syndrome

R. Muller and E. Kugelberg (Department of Neurology, Karolinska, Stockholm, Sweden), J. NEUR. LOND., 22:314-319, November 1959

Muscular weakness is a well known feature of Cushing's syndrome and was mentioned in his original description of the disease.

The motor function of 6 patients with Cushing's syndrome were studied clinically and electromyographically. Muscle biopsy was done in 4 cases.

Five patients had weakness of the muscles of the pelvic girdle and thighs. In 2 this was one of the first symptoms and had progressed rapidly. One had no weakness. One patient had a slight waddling gait and a positive Trendelenburg's test bilaterally. The remaining patients had a normal gait. However, 4 were unable to step up onto a chair or rise from the squatting position without the aid of their hands.

Two patients also had weakness of the muscles of the shoulder girdle and of dorsiflexion of the feet. The weakness of the shoulder girdle was less pronounced than the weakness in the lower extremities. The abdominal, neck, or facial muscles were not involved. No patients complained of muscle pain or tenderness. There was no definite atrophy, no evidence of pseudohypertrophy, and no muscular fasiculations were observed. Muscle reflexes were normal except in 1 patient who had unilateral impairment of the quadriceps reflex. No sensory changes were noted.

The electromyogram showed alteration of the appearance of the individual potentials, in 5 cases. This abnormality consisted of a general reduction in the size and duration of the individual potentials and an increased proportion of polyphasic potentials. The changes were most marked in the patient who had the most severe paresis. Slight changes were seen in distal limb muscles which exhibited no clinical paresis. The electromyographic recordings were normal in the patient who showed no clinical evidence of weakness.

The histological changes consisted of slight or moderate degeneration of muscle fibers, although less than might be expected from the clinical and electromyographic observations.

The authors conclude that the muscular weakness in Cushing's syndrome is due to a true myopathy probably produced by the increased production of corticoids.

In 3 patients treatment resulted in partial or complete regression of the syndrome; however, the muscular weakness persisted.

The Treatment of Poliomyelitis from an Orthopaedic Aspect

L. M. Prior (Royal National Orthopaedic Hospital, Stanmore, England), PHYSIOTHERAPY, 46:39-47, February 1960

This is the last of four papers dealing with physical therapy in the treatment of poliomyelitis. "Orthopaedic aspects" begins soon after onset. In the acute stage rest is emphasized. The patient should be positioned so that mechanical advantage favors the more severely paralyzed muscles to prevent deformities.

In the post acute stage passive movements and stretching are essential. Acute tenderness continues for a variable period; passive stretching should be attempted after obtaining relaxation to avoid protective spasm. Movement is more easily tolerated if done immediately following moist heating when the skin appears slightly soggy. The three point principle used to straighten a curve is an effective safeguard when stretching; contracting the weakened muscle group utilizes reciprocal inhibition. Some residual stiffness in the spine minimizes onset of scoliosis and stabilizes the patient when sitting.

Extensive damage in the spinal cord may occur without being obvious clinically. Reeducation of surviving motor units is the treatment rationale. Kabat's "stretch principle" initiates tension within paralyzed muscles. Loss of conscious awareness of muscle action, described by Sister Kenny as "mental alienation," was confirmed by Sherrington. Any technic establishing the patient's mental awareness of his weakened muscles should be employed. Rest periods permit an intensive program. Decrease in fatigue occurs through "active recuperation": performance of a mass movement pattern, followed by performance of an antagonist pattern, shows noticeable return of strength in apparently fatigued muscle within the original mass movement pattern. Fatigue may be due to emotional disturbance. Modified mass movement patterns based on those of Kabat and Knott have been used successfully for three and one-half years.

Postural balance is impaired by loss of postural reflexes and muscle imbalance. Balance exercises should be undertaken before a long mirror. Progress is dependent upon the patient's ability to stabilize himself. Pelvic stability is essential for secure sitting balance, standing, and walking. Maintaining balance under conditions of extreme weakness can be fatiguing, and the resulting gait unstable. Adequate supportive apparatus must be applied when necessary. Training is best undertaken in a pool with parallel bars and water splints. Apparatus needed initially may be discarded or simplified later to assist learning functional acts. All possibilities connected with walking should be explored.

Progress is recorded by muscle testing. Massage and electrical stimulation are not used, nor much suspension therapy. Group activities and occupational therapy are employed.

Anatomy and Physiology of the Heart in Congenital Heart Disease

Vallee L. Willman (St. Louis, Missouri), AM. J. NURS., 60:190-193, February 1960

With the view that recent progress in operative technics for correction of congenital heart disease necessitates a better knowledge of normal and abnormal anatomy and physiology of the heart, the author has written a short and readable article that covers normal cardiac circulation as well as some of the more common congenital defects.

The pathology of patent ductus arteriosus, arterial and ventricular septal defect, and the tetralogy of

Fallot is considered both physiologically and anatomically and the presentation is enhanced by the use of schematic illustrations.

Results of Chemopallidectomy and Chemothalamectomy: A Study of One Hundred Cases of Parkinsonism with Ages over Sixty

Tung Hui Liu and Irving S. Cooper, (New York University Postgraduate Medical School, 550 First Avenue, New York, New York), A.M.A. ARCH. NEUR., 2:188-193, February 1960

The purpose of this paper is to present clinical and statistical data on the effects of both chemopallidectomy and chemothalamectomy performed between July, 1956, and December, 1958, on a group of 100 cases of parkinsonism in patients 60 years of age and over in order to elucidate the problems involving the indication for operation, as well as the outcome of the surgical procedures. Data concerning preoperative findings, operations, and immediate postoperative results were gathered from hospital records. Questionnaires based on the parkinsonian stigmata and general function and working ability of the patients were sent to all the patients under consideration and were used in compiling findings in the long-range follow-up study.

The age group ranged from 60 to 71 years with a mean of 63. There were 69 men and 31 women in the group. Eighty-three exhibited initial symptoms in the upper extremities. Tremor of the extremities was given as the first symptom in 64 cases, rigidity in 32, and tremor and rigidity in 4. The length of illness ranged from 1 to 33 years with a mean of 7.3 years.

The primary symptoms presented by the group were tremor, rigidity, and bradykinesia.

The rating for patients as surgical candidates was based upon a scale of three: good, fair, and poor. Good candidates were those who were essentially independent in carrying out their daily activities. This group included primarily patients wth unilateral involvement and occasionally some with early bilateral symptomatology. Fair candidates were those who presented a moderate symptom picture, usually bilaterally, and required partial assistance in daily activities. Poor candidates were those with advanced symptom pictures, accompanied by functional incapacitation, autonomic syndromes, and mental aberrations. The group consisted of 42 good, 42 fair, and 16 poor candidates.

Forty-five chemopallidectomies and 72 chemothalamectomies were performed. Re-operation was performed on 13 patients to achieve more satisfactory results. Bilateral operations, with several months intervening, were performed on 4 patients. Postoperative hospitalization ranged from 7 to 99 days, with a mean of 28.

Alleviation of symptoms was classified in three categories: excellent, improved, and unimproved. Excellent results comprised a complete, or virtually complete, arrest of tremor and rigidity with good motor functioning. Patients in this category were ambulatory and self sufficient upon discharge from the hospital.

Improved were those patients who, though their symptoms were somewhat alleviated, had a residual tremor or rigidity as well as those who continued to require some assistance in daily activities. Those who demonstrated no significant improvement in symptoms or were worse, as well as those who remained incapacitated were rated as unimproved. The same rating scale was applied to immediate postoperative results and long term status.

Of the group, immediate postoperative results were rated 68.3 per cent excellent, 25 per cent improved, and 6.7 per cent unimproved (including mortality figures).

There is evident a direct relationship between the type of candidate and the symptomatic relief which can be achieved through surgery. No significant difference between outcomes of procedures carried out on good candidates in age groups of 60-64 years and 65-71 years was demonstrated. Further, no significant difference was demonstrated between the good candidates in this study and a series of 88 patients (good candidates) with a mean age of 49.4 years.

A chi-square test of the chemopallidectomies and chemothalamectomies performed revealed a greater amount of excellent results in the chemothalamectomy cases, with probability of $P>0.01$.

There were 35 instances of transient neurological signs, none of which persisted longer than one month. Mental confusion had the greatest incidence in this geriatric group. Language difficulties occurred in 9.4 per cent of the group. Six patients displayed some degree of contralateral motor weakness. Choreoathetoid movements, hemisensory deficit, and a generalized convulsive seizure occurred once each in the group. There was no significant difference demonstrated in the incidence of complications following the two procedures, although it was noted that mental confusion occurred more frequently after chemopallidectomy and language deficits more frequently after chemothalamectomy.

There was a 3 per cent mortality rate. All deaths were due to acute intracerebral hemorrhage during the immediate postoperative course.

The length of the follow-up study ranged from 6 to 36 months, with a mean of 19.6. It revealed results as follows: 75.4 per cent excellent, 15.4 per cent improved, and 9.2 per cent unimproved. Again, the good candidates exhibited far better results than did the others.

This older group showed a somewhat higher incidence of transient neurological signs than did the younger group and thus the mean postoperative hospitalization time for this group was 28 days as compared to 11-14 days for the younger group.

Expectation of good surgical results depends greatly on the preoperative selection of patients but not on chronologic age.

Electrodiagnostic Definition of the Site and Nature of Peripheral Nerve Lesions

Philippe Bouwens (St. Thomas's Hospital, London, England), ANN. PHYS. M., LOND., 5:149-152, February 1960

Recent development of more accurate and versatile electrodiagnostic equipment has enlarged the scope of clinical study of peripheral nerve lesions. Earlier work was limited to diagnosis of gross lesions of acute traumatic origin: neuropraxia, axonotmesis, and neurotmesis. The clinician is now, however, able to utilize studies of more subtle responses, such as: velocity of conduction and its relation to the caliber of the transmitting nerve fiber, changes in the thresholds of excitability, signs of minimal denervation, and autoexcitation of nerve fibers through irritation or compression. Thus two other conditions resulting from neuronal compression may be considered: "axonostenosis," localized reduction in caliber of the nerve fiber at the site of compression; and "axonocachexia," a reduction in the caliber of the whole length of fiber

distal to the point of pressure following longstanding compression.

A reduction in caliber produces a rise in threshold of excitability and a decrease in velocity of conduction. In electromyographic exploration of muscles supplied by the affected nerve, during stimulation of the nerve the following patterns are seen:

Normal nerve: a compact pattern of summating motor unit action potentials which, except for latency, varies little on stimulation at different levels.

Neuropraxia: no response to stimulation above the lesion and an essentially normal response below.

Axonostenosis: reduction of conduction velocity over the affected portion of nerve, essentially normal response to stimulation below the lesion, and a response which is spread in time to stimulation above. The latter is due to variation in reduction of size of the involved fibers.

Axonocachexia: a gross scattering of response after long latency following stimulation above the lesion, with other changes as for axonostenosis throughout the entire nerve distal to the lesion.

Axonotmesis: fibrillation and the other well known changes of denervation.

Alterations in response appear to be more marked when the lesion is most distal.

Suprascapular Nerve Block for Painful Shoulder

M. Rabson and Jose H. Auday (Tabor Medical Building, Philadelphia), J. ALBERT EINSTEIN M. CENTER, 8:39-42, January 1960

The suprascapular nerve innervates the superior and posterior portion of the shoulder joint capsule and the greater part of its tendon sheath. Its sensory component forms a vital pathway for pain fibers from the shoulder and acromioclavicular joints. Suprascapular nerve block has been a useful procedure in interrupting the vicious pain cycle of acute shoulder bursitis. A dramatic increase in range of motion can be obtained in some patients.

After the injection of the nerve, the patient continues mild "wall climbing" and circumduction exercises. Overactive exercise following injection may increase pain after the anesthesia wears off. Gentle motion will increase the range with little discomfort. The injection may need to be repeated at weekly intervals. Meanwhile, physical therapy, including ultrasound, is continued.

Certain types of shoulder pain will not respond and this technic can then serve as a means of differential diagnosis between bursitis and bicipital tendonitis or cervical root pain.

Abstracters for June

We are indebted to the following Association members for the carefully prepared abstracts that appear in this issue:

Jean Cuthbertson Miriam Partridge
Joan R. Erback Patricia Wakefield
Nancy Watts Geraldine Midgley
Marilyn J. Anderson

Book Reviews . . . . .

Headache: Diagnosis and Treatment. *By Arnold P. Friedman, M.D., Associate Clinical Professor of Neurology, Columbia University; Associate Attending Physician, Neurological Institute, Presbyterian Hospital; Physician in Charge of Headache Unit, Montefiore Hospital, New York. And H. Houston Merritt, M.D., Professor of Neurology, Columbia University; Director of the Service of Neurology, Neurological Institute, Presbyterian Hospital; Acting Vice President in Charge of Medical Affairs and Acting Dean of Faculty of Medicine, Columbia University; Consultant Neurologist, Montefiore Hospital, New York. Cloth; price $8.00. Pp. 401; illus. F. A. Davis Co., Philadelphia, 1959.*

Headache, Diagnosis, and Treatment edited by Arnold P. Friedman, M.D., and H. Houston Merritt, M.D., treats of a subject experienced to some degree by all of us at one time or another. This intriguing common phenomenon might attract more readers unprepared to absorb and synthesize the technical aspects, and to whom the information, beyond general interest, has little practical application. The practicing physician, however, is offered the current, pertinent, and total aspects of the ailment headache, from its possible causes to individual treatment. This exposition, presented by 12 clinicians covers such subjects as the Mechanisms, Diagnostic Principles and Methods, Principles of Pharmocotherapy, Sources of Headache, Psychiatric and Psychogenic Factors, and Surgical Treatment. Throughout, one catches references to the role of physical therapy. The presentation relies primarily upon the written word which in itself is clear with only several pictures and diagrams to illustrate the text. The Headache Chart as used at Montefiore Hospital in New York is included.

As with any disease entity, and particularly with the tenuous headache, the reader is impressed with the need for and the importance of a thorough examination which must include social, environmental, and personality factors. With each type of headache discussed there is included the various forms of treatments tried and their relative effectiveness. Physical therapy when mentioned is considered adjunctive therapy with the primary objective in most cases apparently that of a relaxant. Except for the questioning of the effectiveness and advisability of cervical collars and cervical traction there was no indication of preference among the measures recommended in physical therapy—the specificity depending upon the individual patient and the predominating cause. The questioning of cervical traction was based on the thinking that the joint of a limb where there is avulsion, stretching of muscular and ligamentous structures accompanied by hemorrhage is not subjected to constant traction by stretching. Why then the neck? And the effectiveness of collars was questioned on the basis of a passive support where a postural malalinement exists and which needs instead to be corrected actively by the patient. It was interesting to note the emphasis placed on the importance of postural reeducation; the viewpoint being advanced that, whether primary or secondary, faulty posture from a behavioral or structural standpoint is an important factor in the total management of the headache problem.

On the whole the last chapter, Role of the Cervical Spine in Headache and Head Pain contained the most information of particular interest to the physical therapist. Cervical structures and headaches related to structures were well reviewed. It was shown, for example, how splinting of the muscles or abnormal posturing of the head and neck can irritate the greater occipi-

tal nerve. In this section and elsewhere there was agreement in the treatment of choice of the ubiquitous whiplash injury; the treatment being one of relieving the neck from stress of weight bearing by bed rest in early cases, with a physical therapy regime of gentle passive motion progressing to resistive exercises, postural reeducation, and some form of heat.

Although in most instances references to the role of physical therapy are as a relaxant, supportive, comforting measure, this objective is not to be underestimated in the success of the total program. Effective treatment is based on adequate diagnosis and prescription. However, the prescription means nothing unless applied judiciously. It remains for the physical therapist to give the "headache patient" the same care as the patient with a cord lesion, observing the patient's response to avoid overtreatment and mistreatment. This book deepens one's appreciation of the complexity of the headache problem and leaves to us the obligation to observe clinically the relative effectiveness of one modality over another, and why. This can only be done by reinforcing our clinical experience with current information on underlying mechanisms of different disease entities. *Headache, Diagnosis and Treatment* fulfills this objective.

A Textbook of Neurology. *By H. Houston Merritt, M.D., Professor of Neurology, Columbia University; Director of the Service of Neurology, Neurological Institute, Presbyterian Hospital; Acting Vice President in Charge of Medical Affairs and Acting Dean of the Faculty of Medicine, Columbia University. Consultant Neurologist, Montefiore Hospital, New York. Ed. 2, Cloth; price $12.50. Pp. 765; illus. Lea & Febiger, Philadelphia, 1959.*

The author has maintained in the second edition the excellent standard previously set. He brings the book up-to-date in regards to current concepts in neurology.

The form of the book is the usual pattern of a text. The chapters are determined by etiology. All the usual subjects are covered thoroughly.

The language is direct and uncomplicated. There is considerable effort to present data statistically with the inclusion of many tables from works of the author. Descriptions of various entities are succinct. There is no equivocation in his points of view. The references are adequate. There is much detailed presentation of therapy, including drugs and doses.

This is an excellent textbook of neurology. It is highly recommended for students or physicians seeking a rapid, accurate review of any neurologic subject on a strictly clinical level.

Cape to Cape by Wheelchair. *By Ernest M. Gutman. Foreword by Howard A. Rusk, M.D. Cloth; price $4.75. Pp. 225; illus. Ernear Publications, New York, 1959.*

The author of this book has been practicing law for more than 20 years. He enlisted in the army as a private early in World War II and after almost five years of service was discharged as a captain and with a severe physical disability.

Mr. Gutman has written this story of nearly 50,000 miles of travel by ship, automobile, and wheel chair, hoping to encourage others with physical disabilities to enjoy the pleasure and value of travel as well as to work and live within the limits of their capabilities.

In the foreword of this book Dr. Howard A. Rusk points out the medical progress which has been accomplished in recent years for the rehabilitation of the physically handicapped and emphasizes the importance of the mental attitude of these persons, as well as of those involved with them and of society as a whole. Dr. Rusk believes this story will accomplish the author's purpose, but also will show the changing attitudes of the general public toward the physically handicapped persons, and the provisions which are being made for them to live useful and enjoyable lives.

This interestingly written travelogue is in two parts, each one an account of a planned voyage.

In Part I the author with his faithful wife visits the British West Indies and Brazil, crosses the Atlantic, with a stop at the small island of Ristan da Cunha, to the Cape of Good Hope, where the Atlantic and Indian Oceans meet. Then proceeding north, with a stop at Luanda, across the equator at longitude zero and with landings at several other African ports to Spain and Portugal they return to New York.

On the return voyage the author viewed motion pictures taken in Scandinavia and was so impressed, that he decided he and his "all weather mate" would visit the North Cape country, not following the traditional pattern of "around the world" but "do it from north to south." He says that his wheel chair proved itself a boon to his traveling. "Without seeking special attention I often received it."

Approximately a year later another voyage was in progress which is related in Part II of this book. The first landing was in Iceland, then on to The North Cape, and down the coast of Norway. He visited the other Scandinavian countries and the Netherlands, with a final visit to The World's Fair in Brussels before returning to New York.

This book will be especially interesting to physical therapists and everyone who is closely associated with physically disabled persons and an inspiration to those who are disabled. To quote from Dr. Rusk's foreword: "Probably the greatest asset any traveler can have on a long trip, whether disabled or not, is a sense of humor . . . . Mr. Gutman shows in this book that he has that sense of humor, confidence, and flexibility. The book is evidence that there is no reason for the disabled person to forfeit the pleasures and values of travel simply because of physical disability."

Neurological Basis of Behaviour. *Ciba Foundation Symposium. Edited by G.E.W. Wolstenholme, O.B.E., M.A.M.B.B. Ch., and Cecilia M. O'Connor, B.Sc., Editors for the Ciba Foundation, London, an educational and scientific charity where scientists are encouraged to meet to exchange facts and ideas. Material in book gathered at a Symposium held July 2-4, 1957. Cloth; price $8.00. Pp. 400; illus. Little, Brown & Company, Boston, 1958.*

The 34 persons attending this symposium, honoring the centenary of the birth of Sherrington, were electrophysiologists, anatomists, neurologists, pharmacologists, psychiatrists, endocrinologists, and biologists from various parts of the world. Consequently their papers and the discussions following each one represent the latest developments in their respective fields.

The session was opened by anatomist H. W. Magoun from California, with a scholarly and interesting presentation of the history of ideas on brain-mind relations, from the

fourth century B. C. to the sixteenth century A. D. Professor J. C. Eccles from Australia followed with an outstanding paper on the Behavior of Nerve Cells, in which he demonstrated that interactions between nerve cells may be attributed to synaptic contacts which operate by a specific chemical transmitter mechanism. Behavior, as affected by various drugs, by brain enzymes and by brain area involved, was fully covered by the various papers. The last speaker reported studies of behavior disorders, schizophrenia, and epilepsy, with the neurophysiological data showing a definite correlation to behavior disorders and behavior changes.

The contents of this book can not be read quickly or lightly. The material is presented clearly and concisely, hence there is much to be absorbed. For those who are interested in neurological conditions this well edited book will be an excellent and stimulating source of material.

Metals and Engineering in Bone and Joint Surgery. *By Charles Orville Bechtol, M.D., Professor of Orthopedic Surgery and Chairman of Orthopedic Division, University of California, Los Angeles; Chairman of Subcommittee on Testing, Prosthetics Research Board, National Research Council. Albert Barnett Ferguson, Jr., M.D., Silver Professor of Orthopedic Surgery and Chairman of Orthopedic Department, University of Pittsburgh; Children's and Presbyterian Hospital, Pittsburgh; Consultant, Orthopedic Surgery, U.S. Veterans Hospital, Oakland, Pittsburgh; St. Margaret's Hospital, Pittsburg; Green County Hospital, Waynesburg; and Patrick Gowans Laing, M.B., B.S., F.R.C.S., Assistant Professor of Orthopedic Surgery, University of Pittsburgh; Chief of Orthopedic Service, U.S. Veterans Hospital, Oakland, Pittsburgh. Cloth; price $8.00. Pp. 186; illus. Williams & Wilkins Co., Baltimore, 1959.*

The authors' qualifications for writing this book are well established by the list of titles after each of their names.

The first two chapters, Historical Use of Metals in the Human Body and Metal Behavior, were written by Dr. Ferguson. Chapters three, four and five, Available Metals, Metallic Transfer, and The Use and Care of Metals, were written by Dr. Laing. The last four chapters, Bone as a Structure, Replacement of Living Tissue, Fracture Healing in a Temporary Splint and Internal Fixation with Plates and Screws were written by Dr. Bechtol.

The book was written as a reference for the practicing surgeons who use metal for internal fixation or replacement of portions of bone in reconstructive bone surgery.

The authors have assembled the historical background not only of the use of metal in surgery but also of the types of metals used in plates, screws, and guide wires. They have gone into the failure or success of all types used and the reasons for each. The material of the tools used in fixing the plates and screws is also discussed, and the care of the tools and their use is described. For example, a great many failures can be explained by contact of tools used improperly or of the wrong material with the screws and plates. Also, the handling and storage of plates, screws, and tools are of great importance.

The last part of the book deals with the actual reaction of the bone and other living tissues with the metals used. The amount of distortion and stress an implant can take without breaking is extremely important. Therefore, the size and shape of the implant as well as the size and pitch of the screw threads are discussed. The type of fracture and the amount of circulation that will be disrupted also has to be considered in the size of the implant.

It seems to this reviewer that all phases of the work have been quite well covered. To the surgeon, the book should be particularly helpful with regard to the small things in engineering that may be overlooked or easily forgotten. For the physical therapist or occupational therapist the book should make interesting reading as a review of fractures, the growth and repair of bone, and to give a much better idea of the actual nature of implants. It is particularly interesting in showing limitations of metals and reasons for the failures that are found.

The book itself is printed in easy-to-read type on heavy glossy paper. It is profusely illustrated, having 119 pictures, drawings, and charts. The references are placed at the end of each chapter for easy use. The Appendix consists of an engineering-orthopedic glossary which is a handy reference although not actually necessary because the terms are explained in the text.

This book is extremely interesting to read. The authors' style and their inclusion of details is such that the reader is not aware of the transition from one to another, so that the book is an integrated whole instead of three separate parts. This, of course, adds to its effectiveness.

Being written to fill the gap between the very technical books on the individual subjects (basic structure of bone, fatigue of metals, etc.) and the voluminous articles on work by individuals or groups, this book does just that—and does it well. It should be a handy reference.

The Child With a Handicap: A Team Approach to his Care and Guidance. *Edited by Edgar E. Martiner, M.D., Past President American Academy of Pediatrics; Associate Clinical Professor of Pediatrics Wayne State University, College of Medicine; Chief, Division of Pediatrics, Harper Hospital; Senior Pediatrician, Childrens' Hospital of Michigan and twenty seven contributors. Cloth; price $11.00. Pp. 409; illus., Charles C Thomas, Springfield, Ill., 1959.*

In *The Child With a Handicap*, 27 contributors have assembled the most up-to-date knowledge about handicaps affecting our children and related problems. The well-being of the whole child, rather than the handicapping condition itself, is emphasized throughout, and also the cooperation needed among persons concerned with the patient's welfare. This team approach results from the modern realization that rehabilitation of the handicapped involves adjustments in all phases of being—mental, emotional, social, as well as physical. Thus each author attempts to reveal areas wherein parents, social workers, nurses, teachers, occupational and speech therapists, as well as physicians, may participate in the over-all treatment plan.

The volume itself is divided into three sections: (1) the roles of different workers with the handicapped, (2) the child and the multitude of handicapping conditions being treated today, and (3) guides to materials and planning procedures. Appendices listing available camps, schools, other services and reference books complete this thorough and informative text.

Each chapter is an entity in itself and in most instances chapters may be read in any order. A general pattern followed in most chapters dealing with the various handicaps pre-

sents a description of the condition, incidence, diagnostic features, causes (if known), treatment, problems incurred, and helpful suggestions. The guides give valuable pointers, particularly to parents and teachers—hints about discipline and parental planning, and useful work and play materials.

Although the book is aimed mainly at the general reading public, rather than members of the medical field, this lay reader occasionally found the vocabulary overly technical and hard to follow without the help of a medical dictionary. But, on the other hand, many of the writers succeeded admirably in creating a lucid and enlightening picture of a complex subject. More illustrations and graphs, would have added appreciably to the text.

Fortunately, a broader, community-wide interest is being shown in the handicapped. At the same time, it has become more and more essential to develop an informed public if these children are to be handled wisely and helped toward becoming productive and active members of society. Everyone has the responsibility at least of reaching a greater understanding of these conditions and then making use of this knowledge in some way. Therein lies the value of *The Child With a Handicap*, for it provides not only the most modern view of all handicaps and the problems involved, but also suggestions for all persons concerned with any of the five million handicapped found in our country today.

Rehabilitation Center Planning, an Architectural Guide. *By F. Cuthbert Salmon, AIA and Christine F. Salmon, AIA. Cloth; price $12.50. Pp. 164. The Pennsylvania State University Press, 1959.*

The co-authors of this manuscript visited 28 rehabilitation centers in the United States and Canada to examine and discuss with staff and patients the requirements of the physical plant which houses a rehabilitation center.

It is emphasized that two steps in the planning must be considered before the architect can proceed with his plans. First, the interest of the community and the opportunities within it which will facilitate the program must be surveyed. The attitude of government must be favorable; educational opportunities available; health facilities cooperative; housing, transportation, and utilities convenient to a suitable site which can be obtained; employment opportunities and subcontract work available. Second, the extent of the program, present and future, must be determined. The area to be served should be established and types of disabilities within the area. Age groups, inpatient or outpatient needs, administration, housing, food, and recreation, must be studied with regard to budget and sources of operating income.

The architect now begins to think in "terms of spatial and human relationships." Rehabilitation presents special problems in "limited mobility and acute sensitivity to physical environment." Space, with reference to wheel chairs and stretchers, noise, illumination, flexibility of arrangement, layout of service areas to provide optimum accessibility and room for future expansion must be considered. The site selection—climate, topography, vegetation, soil—and location within the community influence the design of the building. All of these must be considered in relation to the budget.

Chapter VI, "Areas of Activity," provides 116 pages of detailed plans for each component of rehabilitation: medical, social adjustment, vocational, inpatients, space for children's treatment and training, administration, and general areas for lobby and parking space. Each component is treated in three ways: a brief description of the service rendered and personnel involved, a flow chart of intrarelationships and interrelationships with other components, and a detailed floor plan with furniture and equipment arrangements. There are additional charts showing the required personnel per volume of business, and diagrams of individual pieces of equipment and their space requirements.

Chapter VII discusses briefly the psychological importance of factors which de-emphasize the clinical atmosphere and "exert a constructive influence on the rehabilitation program." View, color combinations, wall and floor finishes, and heating systems are a few of the elements presented.

In conclusion, the authors stress the fact that future developments in rehabilitation will require changes. Present planning must be flexible enough to meet the projected plans of the future. A "Supplement 1958" which accompanies this book contains information concerning the services offered and floor plans of 10 existing rehabilitation centers. A study of these with reference to the planning requirements as listed will indicate the good and bad features.

The abundance of excellent diagrams; personnel, activity and flow charts; and floor plans provide an easy understanding of the material presented. A list of references supplies the fundamental philosophy of rehabilitation and its many services.

It is probable that the architectural plans as presented will not be placed as a whole in any one center, yet this book cannot fail to guide those who plan to build a new center or remodel an existing building in selecting what is best for their particular needs.

Progressive Exercise Therapy in Rehabilitation and Physical Education. *By John H. C. Colson, F.C.S.P., M.S.R.G., M.A.O.T., Principal, School of Remedial Gymnastics and Recreational Therapy, and Director of Rehabilitation, Pinefields Hospital, Wakefield, England. Cloth; price $4.50. Pp. 184; illus. Williams & Wilkins Co., Baltimore, and John Wright & Sons, Ltd., Bristol, 1958.*

This book is purposely written for physical therapists, remedial gymnasts, physical educationalists, and students in the aforementioned specialties.

The main purpose of its publication is to instill the idea that success in exercise therapy is primarily due to providing adequate and efficient progression in the exercise program. The author has had more than 20 years' experience in many forms of exercise in hospitals, rehabilitation centers and private clinics, and is thoroughly convinced of its effectiveness. It is not Mr. Colson's intention, however, to defend his position through a lengthy discussion of any sort or to give any physiological concepts. He merely presents a series of exercises which can be readily available and show progression. Contradictions or modifications are not included.

Two thirds of the text provide a collection of free exercises, indicating progression in strength or mobility. The head, neck, trunk, and extremities are included and are satisfactorily illustrated by stick-figure drawings.

A chapter illustrating the use of progressive exercises in certain general surgical and orthopedic conditions serves as an example of application. Unfortunately, the author selected a number of conditions, i.e., grastrectomy, cholecystectomy, and appendectomy which are not among

those most commonly treated in the exercise field. However, his examples suit the purposes for the inclusion of this chapter.

It appears that persons engaged in recreational and gymnastic activities would derive the most benefit from this book.

The Physical Treatment of Varicose Ulcers. *By R. Rowden Foote, F.I.C.S., L.R.C.P., D.R.C.O.G.; Surgeon-in-Charge, Varicose Vein Clinic, Harrow Hospital, London. Formerly Surgeon-in-Charge, Varicose Vein Clinic, Royal Waterloo Hospital for Women and Children, London. With a section on Electrical Adjuncts to Treatment by Miss T. Wareham, M.S.C.P., Superintendent Physiotherapist, St. Bartholomew's Hospital, London. Leather; price $4.00. Pp. 125; illus. E. & S. Livingstone, Ltd., London, courtesy of Williams & Wilkins, Baltimore, 1959.*

The author of this book has prepared it as a practical manual for the physical therapist and the nurse. It was developed to fill a need for bringing together in one cover descriptions of the special technics of bandaging, massage, and exercise used in the treatment of ulcers resulting from impaired venous circulation. The size of the book is such that it may be conveniently carried in the average duty uniform pocket and thus be available for ready reference.

Part I opens with a general discussion of the importance of the "varicose ulcer" question and its impact on the national economy by reason of the large number of working days lost each year by sufferers, as well as by the long and often costly treatment involved. The author emphasizes the importance of establishing specialized clinics in order to insure continuity of care and follow-up of patients with varicose disease and ulceration.

Subsequent chapters of the same section deal briefly but clearly with the salient features of The Anatomy and Physiology of the Venous Systems of the Leg, The Common Types of Leg Ulcers and Their Causes, General Principles in Treatment, and The Role of the Physiotherapist. The numerous illustrations, both photographic and diagrammatic, are well chosen and, in general, well placed in relation to the text.

Part II is then devoted to a practical discussion of the treatment of varicose disease. Throughout his text the author continues to stress the importance of handling the problem as economically as possible. He believes that this can best be accomplished by keeping the patient ambulatory, by working endlessly to educate him to the importance of his own role in effecting his "cure," by utilizing the physical therapist at that time in the patient's progress when he can contribute most effectively, and by providing the patient with simply written, but complete, instructions for the aftercare of his affected limbs.

The chapter on The Treatment of Ulcers by Compression deals with the practical aspects of various types of compression bandages, their advantages and disadvantages at various stages of the patient's treatment, and the technics of their application. He states emphatically that "compression is the sheet anchor in the treatment of ulceration."

The Technic of Massage is treated carefully and completely and includes excellent diagrams and other illustrations. Bisgaard's maneuvers are described along with some variations which, in the author's experience, have proved valuable.

A chapter on Physical Exercises in Treatment presents specialized exercise as an all important part of the treatment of the indurated limb. Specifically, these exercises include redevelopment of atonic muscles to restore their usefulness as a muscle pump and the restoration of normal ankle mobility.

In a discussion of Adjuncts to Regular Treatment the following items are illustrated and briefly covered: special chairs and stools; elastic stockings, socks, and anklets; spa therapy for the lazy patient; and a special diet for obesity.

Finally, Aftercare of the Healed Ulcers features instructions to the patient for home care. These are particularly well written and illustrated. Heavy and upper case type are freely used to emphasize important words and phrases. The whole is calculated to produce the greatest possible impact on the patient and to impress upon him the importance of learning and accepting a "new way of life" which will minimize his difficulties and prevent recurrence of his ulcer. The instructions are interspersed with brief explanations of why such or another procedure is important to him.

A short additional section at the end of the book, Electrical Adjuncts to Treatment, has been contributed by T. Wareham, M.C.S.P. (Teacher's Certificates), Superintendent Physiotherapist, St. Bartholomew's Hospital, London. Miss Wareham discusses the use of Ultraviolet Light, Surging Sinusoidal or Faradism under Pressure, Ultrasonic Therapy, Short Wave Diathermy with Inductothermy Coil, and Ionizations. The technic used for each modality is outlined along with a brief discussion of its advantages, disadvantages, indications, contraindications, and effectiveness.

A short appendix lists British sources for the various types of compression bandages and other specialized items which have been mentioned throughout the book.

This pocket manual would be a valuable addition to the library of the physical therapist with a general practice. Its practical approach, excellent illustrations, and clear instructions make it most usable as a ready reference.

The reviews published here do not necessarily represent the opinions of the American Physical Therapy Association.

Book Reviewers for June will be found on page 452

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60. Arm Sling Suspension Unit

Arm Sling suspension unit for wheel chair helps prevent deformity and encourages activity. Excellent support for patient's arm to facilitate self feeding, exercising, and activities of daily living. Fits any tubular wheel chair with quickly installed bracket.

Overhead support rod can be easily moved when sling is not in use. Sling assembly is adjustable to any position along overhead stainless steel rod. Comfortable leatherette slings adjust to any patient—adult or child. Rehabilitation Products.

(*continued from page* 461)

NOTE: Suggestions for preparation of case reports were published in the October 1957 issue of the *Review*, pages 666-667. Reprints of the suggestions may be requested by writing to the *Physical Therapy Review*.

For more information on items write to The Physical Therapy Review, 1790 Broadway, New York 19, N. Y.

New items which may be of interest to physical therapists will be mentioned in these pages each month. The accompanying explanations are made by the manufacturers and have not been investigated by the *Physical Therapy Review*.

61. Magicar Velocipede

Magicar Velocipede, designed expressly for children, features "Monobar" control, enabling the child to propel and steer with arms alone, no foot control being necessary. Its primary function is to provide pleasure for the handicapped child; however, it also develops muscles and coordination and increases mobility of crippled children.

Featuring Fiberglas and steel construction, with nylon, bronze, and ball bearings throughout, it is designed for safe operation, and built low for stability, also making it easy to get on and off. A backrest and safety belt are also available. Magicar is manufactured in two sizes. MG Industries.

PHYSICAL THERAPIST

DO YOU WANT TO LIVE AND WORK IN ROMANTIC NEW ORLEANS FOR ONE YEAR OR LONGER? 3000 BED TEACHING HOSPITAL. AFFILIATED TWO MEDICAL SCHOOLS. 40 HOUR, 5 DAY WEEK. CIVIL SERVICE, RETIREMENT BENEFITS.

APPLY PERSONNEL DIRECTOR,
CHARITY HOSPITAL,
NEW ORLEANS 12, LOUISIANA

Coming Meetings

International Meetings

Aug. 21-26	Third International Congress of Physical Medicine, Mayflower Hotel, Washington, D.C.
Aug. 28-Sept. 2	International Society for the Welfare of Cripples, Eighth World Congress, Waldorf Astoria, New York City

Positions Available

Physical therapy practice acts have been enacted in 36 states. A listing of State Board Examinations appears in the advertising pages.

PHYSICAL THERAPIST: Immediate opening in a large progressive department in a 1000-bed general hospital offering a variety of experience in treatment of patients: 40-hour week, 3 weeks vacation, minimal salary $4,488. Apply to Dr. E. E. Gordon, Director of Physical Medicine and Rehabilitation, Michael Reese Hospital, 29th & Ellis, Chicago, Ill.

WORK IN SOUTHERN CALIFORNIA: Physical Therapists needed to staff Rehabilitation Service at Rancho Los Amigos Hospital. All aspects of rehabilitation of all age levels including post-acute and convalescent care of respirator patients, general medical, and orthopedic disabilities and all aspects of bracing and prosthetics. In-service training program under direction of physical therapy instructor. Five-day, 40-hour week, holidays, sick leave, vacation privileges, retirement benefits with Civil Service rights. New building and most modern equipment available. Quarters available, laundry furnished. Good beginning salary, annual increases. Write: Personnel Director, Rancho Los Amigos Hospital, Downey, California.

REGISTERED physical therapist, modern GERIATRIC setting, attractive salary plus fringe benefits. House available adjoining premises. Contact Mr. Martin S. Freeman, Hebrew Home for Aged, Inc., 615 Tower Avenue, Hartford, Connecticut, Telephone CHapel 2-6207.

PHYSICAL THERAPISTS: Salary range $385-$440. Vacations, sick leave, holidays, insurance, professional laundry and other benefits. New 120-bed Rehabilitation Center offering complete services to rehab patients and patients from the Acute Adult and Childrens wings of main hospital. Work under the direction of two Physiatrists. May advance from staff to area supervisory positions. Inquire Personnel Department, Iowa Methodist Hospital, Des Moines, Iowa.

PHYSICAL THERAPIST—Male or female. Salary open. Good personnel policies. Hospital fully approved. Apply: Robert M. Murphy, Administrator, Floyd Hospital, Rome, Georgia.

OPENING for STAFF PHYSICAL THERAPIST in 350 bed hospital. Salary commensurate with experience. Liberal personnel policies. For complete information contact Charles Peterson, Chief Physical Therapist, Rex Hospital, Raleigh, N. C.

PHYSICAL THERAPISTS: For general hospital near N.Y.C. Affiliated residency N.Y.U.-Bellevue, active physical medicine and rehabilitation program. Must be eligible for registration in N.Y. State. Liberal benefits. Start $4420 with yearly increments of $290 to $5290. Contact Personnel Supervisor, Grasslands Hospital, Valhalla, N.Y. LY 2-8500, Ext. 61.

PHYSICAL THERAPISTS

Supervisory and staff openings. California registered or eligible. New Rehabilitation Center. Personnel Director, Cedars of Lebanon Hospital, 4833 Fountain Ave., Hollywood 29, California.

PHYSICAL THERAPIST for outpatient Rehabilitation Center directed by physiatrist. Wide variety of treatment program. Coordinated physical, occupational, speech-hearing, psychological, vocational and social services. Excellent personnel policies and working conditions. Contact R. A. Silvanik, Administrator, The Rehabilitation Center of Summit County, Inc., 326 Locust Street Akron 2, Ohio.

PHYSICAL THERAPIST

Immed staff opening for regis'd physical therapist in 250-bed short term gen acute hosp. Oppr for varied exp including treatment of orthopedic and neurosurgical patients. Excl salary and liberal benefits. Contact Personnel Dept Franklin Hosp 14th and Noe Streets San Francisco, Calif.

QUALIFIED PHYSICAL THERAPIST for rehabilitation of children with orthopedic and neurological conditions. Wide variety of patients. Good starting salary with merit increases. Five day week. Annual two week paid vacation. Eleven paid holidays. Sick leave. Excellent retirement plan. Continuous interdisciplinary teaching program. Write: Linda Wessel, Director of Physical Therapy, Illinois Children's Hospital-School, 2551 North Clark Street, Chicago 14, Illinois.

Positions Available

Immediate opening for a registered Physical Therapist for a General Hospital expanding to 207 beds. Paid vacation and sick leave, 40-hr. wk, 7 holidays. Charlotte Hungerford Hospital, Torrington, Conn.

STAFF PHYSICAL THERAPIST for children's rehabilitation center, primarily cerebral palsy. Careful screening program, university affiliations, teaching program, good working conditions. Salary range $3852-$4692. Address Dr. Lenox D. Baker, Medical Director, North Carolina Cerebral Palsy Hospital, Durham, N. C.

Staff Physical Therapist for The Memorial Hospital, Worcester, Massachusetts. Excellent opportunity for recent graduate. Write Personnel Director.

WANTED: Registered Physical Therapist, MALE, minimum, 1 year experience, must be a member of APTA and ARPT. Full time employee, 264-bed fully accredited general hospital, located in beautiful city with State University. In- and outpatient service. Salary commensurate with qualifications. Liberal personnel policies including 40 hr. wk., life and health insurance, 2 wks. annual paid vacation, retirement and social security benefits. Apply Personnel Dept., Brackenridge Hospital, Austin, Texas.

REGISTERED STAFF PHYSICAL THERAPIST—for 1540-bed NP Hospital, $4980 per year or $5470 depending on qualifications. Possible student clinical training program. Positions are in Career Civil Service. Write Personnel Director, VA Hospital, Knoxville, Iowa.

IMMEDIATE OPENING: Qualified physical therapist for new, modern, 748-bed general hospital located on spacious grounds in the suburbs of Cleveland. Excellent opportunity, latest equipment. Five-day, 40-hour week, all holidays and vacation with pay, generous sick leave benefits. Contact Department of Personnel Relations, Highland View Hospital, 3001 Ireland Drive, Cleveland 22, Ohio.

WANTED: Registered Physical Therapist for treating cerebral palsy, orthopedic and polio children from 2-12 years of age. Four week summer vacation, generous Christmas holiday, social security, 12 days sick leave, annual increments. Starting salary $3900, $4200 per annum depending on qualifications. Contact: Sister M. Canice, Supt., Rose-Mary Home for Crippled Children, 19350 Euclid Ave., Cleveland 17, Ohio. Phone: Iv. 1-4823.

PHYSICAL THERAPIST eligible for N. Y. State license and APTA membership; 450-bed general hospital treating in- and outpatients. Five-day week, paid vacation, sick leave, and pension. Salary $4,056. Apply to Personnel Office, Ellis Hospital, Schenectady, N. Y.

STAFF PHYSICAL THERAPIST, male or female; recent graduate desirable. In-service training; 37½ hrs., 5 day wk, liberal vacation, sick leave. $3640 without experience; $3848 after 6 mos; $4056 after 1 yr; yearly increases. Physical Rehab. Dept, Mt Sinai Hosp, New York City.

ASSISTANT CHIEF PHYSICAL THERAPIST (Male, at least three years of experience) and Staff Physical Therapist (Male or female): immediate opening in 315-bed general hospital. Expanding department, headed by physiatrist, treating a wide variety of patients, including In- and outpatients. Excellent salary, commensurate with experience; 40-hour week or extra pay for 44 hours. Other benefits: sick leave, insurance, 3 weeks vacation. Write: Mrs. Nadja Konsen, Chief P.T., St. Alexis Hospital, 5163 Broadway, Cleveland 27, Ohio.

High starting salary with credit for experience; rapid advancement; overtime pay; life and hospital insurance; sick leave; 3 weeks paid vacation. Pleasant working conditions in private hospital setting associated with 3 full-time physiatrists. Graduate physical therapists interested in progressive restorative medicine should contact Director of Research and Education, Institute of Physical Medicine and Rehabilitation, 619 N. E. Glen Oak Avenue, Peoria, Illinois.

GRADUATES OF APPROVED SCHOOLS FOR PHYSICAL THERAPISTS, *new legislation provides that you may now practice under professional supervision in this State pending registration with the California Board of Medical Examiners.* Positions open in State Hospitals, the Veterans Home and special schools for handicapped children. Starting salaries $436.00 and up; liberal employee benefits; promotional opportunities. Streamlined civil service examinations twice a month in San Francisco and Los Angeles, and on request in other states near candidate's residence. Write State Personnel Board, 801 Capitol Avenue, P.T. 71, Sacramento 14, California.

(continued on next page)

Classified WANT-ADS

New Rates

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Typewrite your advertisement carefully and count 50 characters and spaces per line.

ALL WANT-ADS MUST BE PAID FOR IN ADVANCE. Make checks or money orders payable to the American Physical Therapy Association.

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Institutions or physical therapists who do not wish their identity known may arrange for Blind Ad Code No. All such want-ads must include the following which will be counted as 2 lines:

Address replies to ..... care of **The Physical Therapy Review, 1790 Broadway, New York 19, N. Y.**

IMPORTANT

It is understood and agreed that the publisher shall have the right to reject or change the wording of any advertisement which in the opinion of the Editorial Board shall not be in agreement with the ethical standing of this publication.

Positions Available

PHYSICAL THERAPIST: N. Y. Polyclinic Hospital expanding physical medicine & rehabilitation depts. General rehabilitation problems. Sick leave, paid vacation, partial maintenance. 345 W. 50 St., N. Y. 19, N. Y. CO 5-8000.

STAFF PHYSICAL THERAPIST: To help service 490-bed hospital. Cross-section of medical and surgical disabilities treated. Congenial working conditions. Liberal salary and fringe benefits. Five-day, 40-hour week. Apply Personnel Department, The Grace Hospital, 4160 John R., Detroit 1, Michigan.

STAFF PHYSICAL THERAPIST, female preferred, for general outpatient program. Salary range from $3850-$4800. Beginning date, June 15. Five day week, liberal vacation and sick leave. Social Security. Apply: Mrs. C. D. Cochrane, Assistant Director, Junior Service League Orthopedic Center, 1219 Dunn Avenue, Daytona Beach, Florida.

REGISTERED STAFF PHYSICAL THERAPIST for 140-bed hospital. Emphasis on rehabilitating children. Valuable experience in muscle testing; clinical teaching; outpatient program. Salary and personnel policies furnished on request. Apply Lucy Straw, Director, Physical Therapy Department, N. C. Orthopedic Hospital, Gastonia, N. C.

Municipal hospital of 704 beds needs two Registered PHYSICAL THERAPISTS (Male-Female) for expanded outpatient and inpatient program with wide variety of cases. Liberal personnel policies, 40-hour week, 2 weeks vacation, sick leave, etc. Salary $4888 to $5863 within 4 years. Write to R. E. White, Personnel Office, Hurley Hospital, Flint 2, Michigan.

PHYSICAL THERAPIST: Orthopedic Clinic staffed by three orthopedic surgeons, in one of Chicago's beautiful North Shore suburbs. Interested only in top notch, experienced individual. Salary open. Ravinia Orthopedic Clinic, 695 Roger Williams Ave., Highland Park, Illinois.

IMMEDIATE OPENING for physical therapist (female) for Barney Convalescent (Children's) Hospital. Pleasant working conditions in new well equipped building. Salary open. Apply: Director, Barney Convalescent Hospital, 1735 Chapel Street, Dayton 4, Ohio.

WANTED: PHYSICAL THERAPIST, registered, for general hospital located in coastal resort area. Good opportunity and working conditions. Salary open. Write to Director, James Walker Memorial Hospital, Wilmington, N. C.

PHYSICAL THERAPIST to fill vacancy in $1,250,000 expansion, APTA; AMA approved graduate. Complete diversity of treatments; 50% of census is children. Excellent wage and vacation plan. Contact Mr. R. Ward, Administrator, Sunnyview Orthopedic & Rehabilitation Center, 124 Rosa Road, Schenectady, New York.

QUALIFIED PHYSICAL THERAPIST for staff position in a 440-bed hospital. Department soon to be enlarged. Wide variety of cases divided between hospital and outpatient. Forty-hour week, paid vacation, sick leave and holidays; salary open depending upon qualifications and experience. Excellent opportunity in a growing community located in the Valley of the Sun, winter capital of the Southwest. Apply Personnel Director, Good Samaritan Hospital, Phoenix, Arizona.

STAFF PHYSICAL THERAPIST: State Crippled Childrens Program, P.T. Clinics held in various health departments. Merit system status, retirement benefits, liberal vacation and sick leave. Salary range $4512-5640. Travel expenses paid. Responsible, challenging and secure position. Write: Director of Personnel, State Health Department, Richmond, Virginia.

STAFF PHYSICAL THERAPIST: for outpatient rehabilitation center treating both children and adults. Experience preferred but not essential. Starting salary, without experience, $4,500. Forty hour, five day week. Excellent personnel policies. Contact: Benedict R. Kraus, Chief P.T., Community Rehabilitation Clinic, 614 Dartmouth, S.W., Canton 10, Ohio.

WANTED: Qualified female physical therapist for well equipped department in a modern 350-bed general hospital. Paid vacation, sick leave, 6 holidays, salary open. Apply L. E. Thompson, Personnel Director, St. Rita's Hospital, Lima, Ohio.

WANTED: A Registered Physical Therapist for a progressive 408-bed general and teaching hospital. Excellent working atmosphere and opportunity to gain some valuable experience. Starting salary is $4800.00 with periodic merit raises, paid vacations, paid holidays, paid sick leave, partial payment of Blue Cross and liberal personnel policies. Hospital is located between a beautiful residential area and a new modern college and cultural center. For more information write to: Mr. Van Buran, Personnel Director, St. Joseph Hospital, 302 Kensington, Flint, Michigan.

SENIOR THERAPIST AND STAFF PHYSICAL THERAPIST for expanding and progressive rehabilitation program in Baltimore and Hagerstown, Maryland. Salary: Senior $5,040.00, Staff $4,540.00 with annual increments, vacation and sick leave. New and well-equipped clinics, forty-hour, five-day week, inpatients only. Apply Dr. Florence Mahoney, Director Rehabilitation Medicine, or Miss Dorothea Barthel, Supervising Physical Therapist, Montebello Hospital, 2201 Argonne Drive, Baltimore 18, Maryland.

EXPANDING DEPARTMENT in 160-bed general hospital has one Staff Therapist vacancy. Personable well trained Chief Therapist. Starting annual salary $5,500, plus other liberal benefits at this hospital "on the Mississippi." Write Administrator, Burlington Hospital, Burlington, Iowa.

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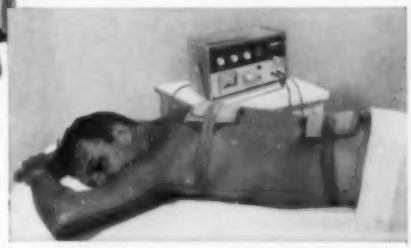

With the introduction of the Burdick MS-600, the currents used for both diagnosis and therapy in muscle disorders are available in a single, compact unit. For effective muscle stimulation without patient discomfort, the MS-600 produces a modified square wave pulse of approximately 500 microseconds duration. Pulse rate may be varied from 1 to 85 per second.

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- **Variable resistance patterns** that permit coordination of strength potential and resistance to give the patient appropriate maximum or minimum resistance at any desired point through the range of motion. This patented feature can be achieved only by a unit using weights for resistance.

- **Accurate control** of the amount of resistance throughout the long life of the Unit . . . achieved through the use of calibrated weights instead of a friction brake.

- **Axis of the knee joint** and of torque unit in one straight line. This insures not only full range of motion but a more consistent and accurate treatment as well.

- **Weights easily moved** along the calibrated resistance arm to provide a conventional ½, ¾ and maximum-resistance sequence without adding weights.

- **Patented suspension-type legrest** eliminating pressure and friction from the leg and making the treatment more comfortable for the patient.

The N-K Unit is easily and conveniently used for B.K. amputees and B.K. fracture cases simply by sliding the leg rest to a point above the injury.

The all-welded chrome-plated tubular steel table and the comfort of the web suspension-type leg contact are added features that have made N-K Units the most widely used unit of its type in Physical Therapy Departments and Rehabilitation Centers. In time economy, comfort, and effectiveness **N-K leads the way.**

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